MOTHER NATURE'S CHILDREN

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MOTHER NATURE'S CHILDREN

BY

ALLEN WALTON GOULD

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PREFACE.

This book aims to help the young to see the spirit rather than the form of nature. It traces the love and care and mutual dependence of living things from human beings down to plants. And while it is set in an imaginative framework, no facts are stated and no illustrations used save on good scientific authority. Recognizing the power of pictures to reach the child, such subjects are treated as can be illustrated. Each chapter opens with a picture by some artist of acknowledged ability and contains other interesting pictures bearing directly on the text.

In using the book in the schoolroom it might be well to have the children look at the pictures and tell what they see before the descriptions are read. They will thus learn to observe and to think for themselves as well as to express themselves. The pictures and descriptions can be made more real by bringing into the class-room some specimen of the plant or animal or nest or other object that is described.

But in dwelling on these material facts of nature, we must be careful not to let them obscure the truth we wish to teach, or bewilder the child by their multiplicity. We must remember that it is not the formal part of nature, but the spiritual part we wish to teach through the forms. We must try to give the children no more of body than shows soul, as Browning says of painting.

Our purpose is to teach only the actual facts about nature. But as every fact is a fairy tale in the mind of the child, these facts will "take form and limb" in a way that would make them untrue for us. They may seem childish to us, but we must remember that all conceptions are necessarily childish when really imaged by children. That is the only way the truth can be held by the child. If we impress upon the child the love and faithfulness of nature, and also the way in which nature requires effort and desert, we can safely leave the reconciliation of those ideas to the later years of the pupil.

Heartfelt thanks are due to many friends, on both sides of the water, who have helped with suggestions and criticisms and encouragement in this effort to put the everlasting gospel of nature in such a form that even the children may read and understand it. If this result is achieved, surely we shall all feel that we have our exceeding great reward.

ALLEN WALTON GOULD.

Chicago Institute.

CONTENTS.

CHAPTER		PAGE
I.	How the Birds Cradle their Babies	1
II.	How Mammals, Spiders, and Fish Cradle their Babies	9
III.	How Babies are Cradled in Clay and Wood	17
IV.	How the Plants Cradle their Babies	25
V.	How the Plants Tend their Babies	33
VI.	How Mammals Tend their Babies	41
VII.	How Fish, Reptiles, and Spiders Tend their Babies	49
VIII.	How Mother Nature Sets the Table for Birds	57
IX.	How Mother Nature Sets the Table for Reptiles, Fish, and Spiders	65
X.	How Mother Nature Sets the Table for the Insects	73
XI.	How Mother Nature Sets the Table for Plants	81
XII.	How Mother Nature Clothes the Birds	89
XIII.	How Mother Nature Clothes the Mammals	97
XIV.	How Mother Nature Clothes the Mollusks	105
XV.	How Mother Nature Clothes the Plants	113
XVI.	How Seeds Learn to Fly	121
XVII.	How Reptiles and Mammals Learn to Fly	129
XVIII.	How Birds Learn to Fly	137
XIX.	Helping Each Other in the Early Family	145

CHAPTER PAGE

XX. Helping Each Other in the Sister Family . . . 153

XXI. Helping Each Other in Flocks and Herds . . . 161

XXII. How Human Beings Help Each Other 169

XXIII. How Men and Birds Lay up Food 177

XXIV. How the Rodents Lay up Food 185

XXV. How the Insects Lay up Food 193

XXVI. How the Plants Lay up Food 201

XXVII. Borrowing Strength from Others 209

XXVIII. Borrowing Clothing from Others 217

XXIX. Borrowing Food from Others 225

XXX. Sleeping and Waking Daily 233

XXXI. Sleeping and Waking Yearly 241

XXXII. Sleeping and Waking for a Lifetime 249

MOTHER NATURE'S CHILDREN.

CHAPTER I.

HOW THE BIRDS CRADLE THEIR BABIES.

THAT baby in the picture ought to be a happy little child. She has been playing with the pet lamb that you see lying in front of the cradle, and with the dog who is rubbing his head against the cradle to show how much he loves his little playmate. And she had such fun watching that mother hen feed

her three cunning little chickens. But when she grew tired of play and wanted to sleep, she did not have to lie down on the hard ground. She found a cradle ready for her. Where do you suppose she got that little rocking cot, with a soft bed in it to lie on and a cover at the head to keep the wind and light from her while she slept? Of course she could not have made it herself. Some one else must have made it for her. I think it was her father who made it for her, or got some one else to make it. And it must have been her mother who made the soft bedding for the baby. You can see the father and mother both looking so lovingly at their sleeping baby. But why do you suppose they took the trouble to make such a cradle for the child? They cannot speak in the picture, but I think if they could speak they would tell you that they did it because they loved her. If you ask your own father and mother why they made your little bed for you, I am sure they will say it was because of love for you.

But birds, and other creatures too, all make cradles for their young, and even the plants cradle their babies in beautiful flowers. They cannot tell us in words why they do it, any more than the parents in the picture can; but we cannot help thinking that it is because of their love for their little ones. The same Great Love seems to be in us all, — in man and birds and insects and plants, — coaxing us to make cradles for the children because we love them.

Here is the cradle the humming-bird makes for her baby (Fig. 2). You see it is no bigger than half an egg-shell, and the one in the picture has two eggs in it about the size of peas. It was made by those two beautiful birds that sit on the rose-bush beside it. Mr. Humming-bird and his little wife live in Mexico and build their nests in the gardens there. How do

you suppose they manage to make such a dainty little cradle for their tiny babies?

If you and I could steal softly to their rosebush when they were at work, we should see first one bird and then the other come with a mouthful of spider's webs mixed with the downy fibres that grow on seeds like the soft white threads that float the dandelion seeds. Each bird would put the down on the bush where the nest was to be, and would tie it fast to the branch by winding the spider's web about it.

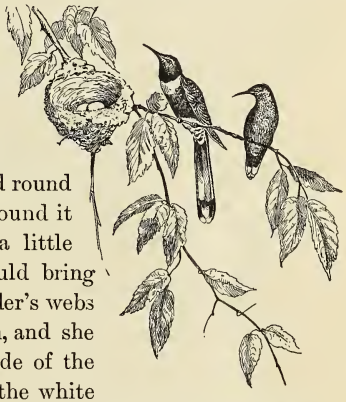


Fig. 2.—The Humming-Bird's Cradle.

Soon the mother bird would seat herself on the pile of fibres, and by turning round and round on it she would press it and round it into the circular bottom of a little nest. Then the husband would bring her more downy fibres and spider's webs as fast as he could find them, and she would work them into the side of the nest in the same way. But the white down of the nest could be seen a long way off, so that you could find the nest easily if the down were left uncovered. So the wise little birds gather bits of gray lichen or thin moss, such as you find on the tree trunks or rocks, and put them all over the outside of the nest, and make it look just the same color as the bush on which it rests, to hide it from us. In a week they finish their work, and then in a day or two you would find two little eggs, and a couple weeks later you would see two of the tiniest little birdies you ever saw.

The next picture (Fig. 3) shows you the oriole's nest. It looks like a bag, and it is really a bag; but it has one great advantage, — the babies cannot fall out of it. I suppose that is what Mr. and Mrs. Oriole thought when they decided to make such a nest as the one in the picture, for it is exactly like a bag with the three corners fastened to the branches of the tree. Their dear little babies will be safe enough in it. But how could birds weave such a nest as this?

Fig. 3. — The Oriole's Nest.

Perhaps you have seen the oriole picking up strings and long grasses about the orchards or lawns in the spring and flying away with them. He takes one of the longest and strongest and winds one end of it around a branch of the tree he has chosen for his nursery. Then he winds the other end of the strand about another branch close by, leaving a loop hanging down as long as he wishes the nest to be.

Then his mate brings another strand and makes a loop with it, just as Mr. Oriole did with his, so that two loops are now hanging down. They do this again and again, till they think they have loops enough for their bag. Then they begin to weave in between the strands finer material, like down or tow. Usually one of the birds stays inside, weaving and picking and pressing the down and tow into shape, while the other brings it from the fields or forest.

As you may imagine, they are very glad to get anything that they can use in making this cradle. One nest was made almost entirely of tow furnished by a man who loved birds, and the oriole was so delighted to have such a gift that he would burst into song with his mouth full of tow. He could not wait to express his thanks till he came back for more. But they do not always wait for people to give them the strings they want. One eager pair were making their nest not far from a house where a woman sat sewing by an open window. She left the room for a moment, and when she came back she could not find the measuring tape or the skein of silk she had been using. The birds had flown into the window and carried them off and woven them into their nest.

I will tell you the story of something that befell a Mrs. Oriole who did this. She and husband were a very happy pair. They had first met each other in an orchard in the beautiful month of May. Two or three gaily colored songsters of the Oriole family had been trying to win this young lady bird as their wife. Each one of them had sung his sweetest to her and looked his finest and behaved his best, in order to persuade her to choose him. But when she saw Mr. Oriole and heard him sing to her, she fell in love with him at once. And when she had chosen him, you should have seen how fond he was of her, — singing to her, bringing her the daintiest bits of food he could find, talking to her in the sweetest little ripple of coo-ings, and doing everything he could for her.

After a day or two they went house-hunting for a tree to hang their cradle in. They flew from one tree to another for several days, till at last they found a graceful elm where there were two drooping branches close together and high up out of the reach of cats and bad boys. Then they set to work at once

weaving their little cradle. Early in the morning, before you and I were awake, they were flying over the fields and through the forests to find the bits of fibre they needed.

They had been working for four days early and late, and in a day or two more they would have finished the nest, when Mrs. Oriole happened to spy a skein of thread hanging by an open window. She thought that this would be just what she wanted and would save her many a long search. So she darted into the window, caught the thread in her mouth, and flew quickly to the nest. There she found her husband hard at work weaving in a horsehair he had found in a pasture. He was delighted with the thread, and they both set to work to weave it in and out through the sides of the nest.

Fig. 4.—The Titmouse's Nest.

But it was so long that it got into a snarl, and as they were trying to straighten it out Mrs. Oriole somehow got both her tiny feet caught in one of the knots. Her husband tried his best to help her and picked at the knot, but he could not untie it. He could only moan with her, and she would have lost her life if some kind man had not happened to hear them and cut the string for them.

Mr. and Mrs. Titmouse make a cradle that is safer even than the bag of the Orioles; for these ingenious little birds have covered the nest all over at the top and made a round passage-

way at the side, like the neck of a bottle or flask, tipped to one side, as you see in the picture (Fig. 4). These bright little cradlemakers are foreign relatives of our own Chickadees. They live in Europe, and are called Titmice, because they are so small. But small as they are, they have found out how to make a nest that keeps the sun and wind and rain from the babies they love so well.

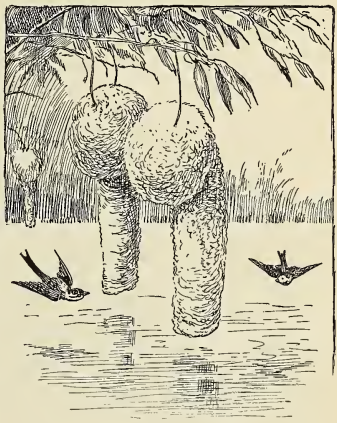


Fig. 5. — The African Weaver's Nest.

But the Weaver birds of Africa have made something still better. They have hung their nests (Fig. 5) upside down, with the entrance at the very bottom, like a decanter wrong side up. They have a safe little cot for their babies at the large part of the nest, with a high side to keep them from falling out. When they build their hanging nests, one of the birds stays inside and the other outside. The outside bird pushes a strip of grass through the strands, and the bird within pushes it back in another place; and so they weave the strip out and in till their baby's cradle is finished. They only stop now and then for a frolic, chasing each other merrily through the trees with many a gentle twitter and loving caress.

They like play as much as you do. But these loving pairs never quarrel. Each seems to think that the other is just right. The nearest approach to a quarrel that I have heard of in Birdland was where one bird refused to bring any more stuff to

weave into the nest till his little mate had taken a romp with him. He even picked at the nest roguishly, as if he would tear it down. His mate came out of the nest and gave him a little love-pat with her bill, and then darted off through the trees for just a minute's sport with him. At the end of the minute they were back at work as hard as ever, making a cradle for their dear little babies.

He prayeth well who loveth well
Both man and bird and beast;
He prayeth best who loveth best
All things both great and small;
For the dear God who loveth us,
He made and loveth all. — COLERIDGE.

TEACHING NOTES.

The spirit and method under which these chapters can be made to accomplish their purpose is indicated in the Preface.

The opening picture by Landseer is a lesson in itself, and may lead to acquaintance with other animal pictures by this great artist, now readily obtainable in convenient form for school use.

The following are appropriate topics for conversational and language exercises in connection with this and the three following chapters, which are intended to cover a month of time and bear upon a single branch of the book: —

How nests are made; why birds build in trees rather than on the ground; why more often on tips of branches than close to the trunk; why with openings below in the land of monkeys; why some have their nests over water; why such as have strong feet for walking or swimming do not need finely woven nests; why the birds that have strong beaks for fighting do not make fine nests, and other questions to make children see the wisdom as well as the love of birds.

A collection of abandoned nests will add greatly to the profit and interest of the reading.

CHAPTER II.

HOW MICE AND SQUIRRELS, FISH AND SPIDERS, CRADLE THEIR BABIES.

HERE is a happy little family, and they have a cradle large enough for them all to snuggle into at night, if they pack themselves very close together. How do you suppose they managed to make this tiny cradle? I do not think you ever saw them building a nest, because they are so very shy and put their cradle so deep in the forest and so high on the tree. But an Englishman once got near enough to watch them, by wearing clothes the color of the forest and lying perfectly still on the ground, so that they could neither see nor hear him. And he tells us how the squirrels do it.

In the first place, Mr. Squirrel had to get himself a wife, —

and that was no easy task. There were a dozen other young squirrels who wanted to marry this same Miss Squirrel, and so he had to show himself stronger and braver than all the rest of them before he could persuade her that he was the best. Even then she led him a merry dance through the trees. She ran to the very top of the tallest tree, keeping on the other side of the trunk from him and peeping mischievously around it now and then at him with her bright eyes.

And when he thought he had caught her at the top, she dodged him and scampered gaily down to the lowest branch. When she reached that, she jumped lightly to the ground and was up another tree and out of sight in a second. He raced after her but could not see her or hear her anywhere. Then he stopped and peered into the branches and tipped his pretty little head over on one side as if he were listening with all his might. In a minute or two he heard the faintest little footfalls, and away he was after her again.

So they played hide and seek through the forest till she let him catch up with her at last, and then they came scampering back again, leaping lightly from one tree to another. After a while they began to think of a cradle for the little ones, though they kept up their merry sport whenever they were not at work building the nest.

The first thing they did was to find some large bird's nest of last year to use as a floor for their cradle. Then they went down to the ground and gathered ever so many mouthfuls of dead grass or flower stalks, nibbling them off close to the lower end. When they had brought up enough, they put on a rounded top and wove in the twigs and grass and stalks so close together that neither wind nor rain could get in to wet the little babies when they came. Inside they put soft moss, while

Mother Squirrel pulled out a lot of hair from her breast to make the softest possible couch for her dear little babies.

And when the babies come she cares for them tenderly; and she will not desert them, either, if any danger threatens them. She and her husband have two or three other nests besides this softly lined cradle. If any bad boy climbs to this one, the papa and mamma take their little ones in their mouths and carry them off to another nest. But once, when the mother could not carry off her babies, she staid in the nest, even when the tree was cut down and came crashing to the ground, and she refused to leave her little ones even when they were put in a cage.

Another time, when Mr. Audubon here in America took a nest of baby flying squirrels home, their mother went with them, and he put them all in a table drawer, leaving it open a little crack. The next morning the mother was gone, but the babies were there. He tried to feed them, but they would not take anything, — yet they seemed to be growing larger every day. After several days he felt sure that they must be getting food somewhere, and so he thought he would watch them by night as well as by day. He hid himself in the room, and as soon as it began to grow dark the mother squirrel suddenly peeped into the window. Finding no one in sight, she ran softly over to her babies and nestled down to nurse them.

I suppose she felt something as your own mother would feel if she had to go into a lion's den. But if her baby was in the lion's den and crying to be fed, your mother would go, at the risk of her life. And the little squirrel mother risked her life, too, because she loved her children more than her life.

We have had babies in a bag and in a bottle, you remember, and now we have them in a ball. And these are about the tiniest babies there are among mammals. You see the papa

and the mamma in the picture (Fig. 7). The mamma has found something to eat, — a fly, perhaps, — and she is sitting up on the top of the nest and holding the bit of food in her hands while she nibbles it. Her husband is climbing up the stalks of wheat and holding himself fast by coiling his tail about the stem. They are the tiny harvest mice of Europe, and are only two inches long, and so light that it would take a hundred of them to weigh a pound.

Fig. 7. — Nest of the Harvest Mouse.

But small and light as they are, they make a prettier nest for their little ones than any other animal. They find a place where ten or fifteen stalks of grain are standing close together, and then they take the grass-like blades that grow on the grain and draw them through their mouths with their teeth shut, and so divide them into a lot of fine fibres. But they do not break them from the stalks of wheat. They pull them together so that the stems of wheat make the supports for the cradle. Then they weave the strands of grass in and out, as you see in the picture, making a perfect ball somewhat smaller than a tennis ball.

When it is finished the wheat goes on growing and the fibres stay green for a long while, so that the nest looks just like the rest of the grain and cannot easily be seen by any one. The

inside of the nest is soft and smooth, because the little parents line it with the down of thistles and dandelions to make it comfortable for the six or eight little babies that the small mamma will soon be caring for. Those babies fill the nest so full that Mrs. Mouse can hardly squeeze in to feed them. Whenever she leaves them for a few moments she pulls the strands of grass together over the entrance, so that you and I would not be able to find any opening at all.

But the baby mice do not stay in their ball very long. When they are two or three weeks old the papa and mamma help them down the stalks to the ground and begin to teach them how to make a living, — for a mouse has to make a living, you know, as well as a man. They soon learn to climb and jump and swim, and to find the little insects and seeds they eat, and then they are able to start in life for themselves.

But if any one attempts to catch them while they are still in the cradle, the little mother will try to run away with them all in her arms at once, using her tail to hold them to her. Of course she cannot run very fast with such a load as that; but she loves them so much that she will allow herself to be caught rather than desert them.

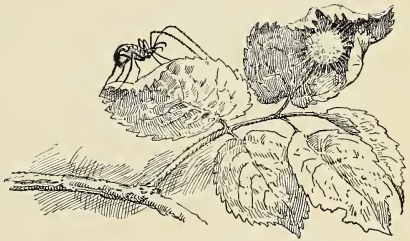


Fig. 8. — The Crowned Spider's Cocoon.

But little Mrs. Harvest Mouse is not the only mother who weaves a ball for her babies' cradle. Mrs. Spider makes a little bed of soft fluffy silk for her eggs, and then weaves a silk ball around the bed. The ball is soft

and yielding inside, but hard and smooth outside. You see such a little ball full of spider babies in the picture (Fig. 8). The mother has fastened her cradle to a leaf by spinning threads all about it, and she has tied the edges of the leaf together to make the nest still safer. Then she sits beside it on a leaf to watch over it till the eggs are hatched and the babies ready to come out. If you break off the leaf and throw it to the ground, she will immediately raise it to some bush again by spinning threads from the bush to it and then drawing it up. If you tear a hole in it, she will mend it with new silk, so as to keep her babies safe.

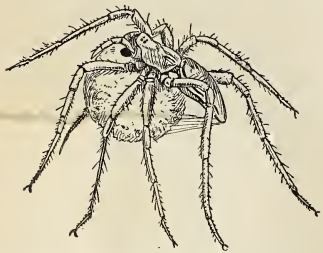


Fig. 9. — Hunting Spider's Cocoon.

In the other picture (Fig. 9) the mother spider is so careful of her ball of babies that she even carries it around in her arms and will not let go of it for a moment. If you are cruel enough to pull it away from her by force, she is wild with anxiety till she finds it again, when she hugs it tighter than ever, just as your mother would if she should lose you and find you once more.

A Frenchman who was studying spiders once threw a mother and her ball of babies into the pit of an ant-lion, — a horrible creature who is fond of eating spider babies, and spider mothers, too, whenever he can get them. The mother tried hard to pull her little ones from the jaws of the monster, but all in vain. Then the man who was watching her thought he would save her life, and so drew her out of the pit, leaving her half-devoured nest behind. But the moment he let go his hold of her she rushed back again and seized her nest, right in the

jaws of the ant-lion. She loved her babies even more than her life.

Even the fish down in the water love their little ones well enough to make cradles for them. They have no hands or feet, — nothing but their mouths to work with, — yet they manage to weave a comfortable little nest. In the picture (Fig. 10) you see two sticklebacks beside a nest that has just been filled with eggs, after the papa had built it; for it is the Papa Stickleback who does all of the cradle-making. If you could get close to the bank of a brook without his noticing you, you would see him rushing about in search of stuff for his nest. He gets a bit of weed in one place and a tiny stick in another, and tugs them along in his mouth to the place he has chosen. There he puts them down, one after another, laying them close together.

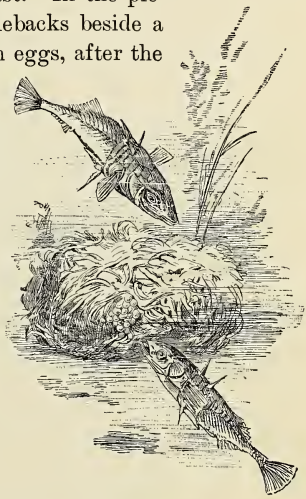


Fig. 10. — Nest of the Stickleback.

If a stick will not fit one way, he pulls it out and puts it in another way; or if it is too crooked or too light, he carries it off to a distance and drops it, and gets another, straighter or heavier, in its place. He tries the weight of the sticks by letting them drop. If they fall through the water rapidly, he uses them; if not, he leaves them. When he has got material enough for the floor of his nest, he glues the pieces together by rubbing his body over them; for you know how sticky a fish's body makes anything he touches.

Then he scoops up a mouthful or two of sand from the bottom of the brook, and scatters it over the floor of the nest to make it heavier and more stable. After that he builds up the sides of the nest, rubbing round and round it with his body to stick it fast, and spinning a sort of gluey thread to bind it together, something as a spider spins its web. The roof he makes in the same way, only he has to go through the nest often to keep it the right shape and to smooth it inside. It is pretty hard work for the little fellow, — for he is only about as large as a baby's little finger, — and he gets so excited with his work that he never stops to rest or to eat.

When he has finished it to suit him, he goes off to find Mrs. Stickleback and coax her to fill his nest with eggs. Then he stands guard over it for many weeks, caring for the eggs, and later for the baby fish. And though he is so small, he will rush upon any fish, no matter how large, that venture to come near his precious charge. He will strike at their eyes, bite their fins, and stick his sharp spine into them, till they are glad to swim off and let his babies alone.

God made all the creatures, and gave them our love and our fear,
To give sign we and they are his children, one family here.

BROWNING.

TEACHING NOTES.

Marvels of Animal Life by C. F. Holder has a full account of the nests of fish; and *Chamber's Journal* for 1850 describes the "Ways of the Squirrel"; and *Homes without Hands* by J. G. Wood is a good book for the whole subject.

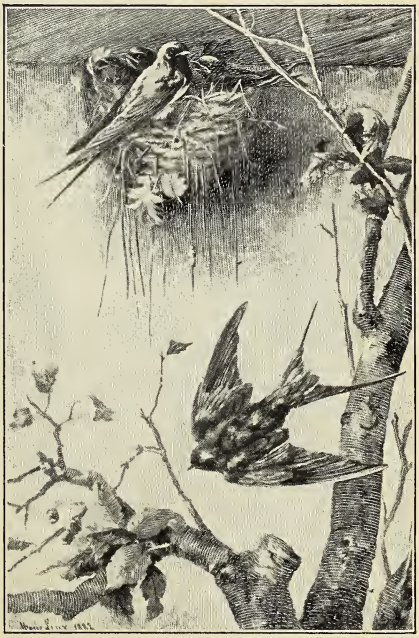
Have the children tell how the nests are made and how the tools used by man have been suggested by the work of animals without tools.

Ask why it is the smallest animals and fish that make the most careful cradles; why the squirrel and harvest mouse rather than the lion or bear or shark keep the purpose of the nests steadily in view.

CHAPTER III.

HOW BABIES ARE CRADLED IN CLAY AND WOOD.

THIS picture shows a family of swallows in France. But our swallows here in America build just the same sort of a nest that you see here, and sing the same sweet little twittering song. About the only difference between the French swallows and those in America is that our Mr. Swallow sits on the eggs sometimes and lets MRS. Swallow have an hour or two off, while his French cousin lets Madame Swallow do all of the sitting herself, though he is very faithful in getting her food as long as she has to stay on the nest.



And how do they build this nest? They are very sociable little

birds and like to have their nest close to their neighbor's nest, so where you find one nest you will generally find a lot more near by. They are fond of men too, as well as of birds, and so they have left the woods and fields, and chosen sheds and barns for their nesting places. Away up north in British America some men built a rough shed for a temporary blacksmith shop far away from any other buildings. Almost before it was finished two swallows came flying into it as if they were delighted to find civilized beings like themselves. And they went to work at once building their nest right over the anvil within a few feet of the heads of the workmen.

In the town where I lived in my boyhood there was one barn that used to be lined under the eaves with dozens of swallows' nests, while there were a hundred other barns all around without a single swallow's nest. The birds had all built in this one place to be together. And I used to watch them as they swept gaily back and forth, building their nests on beautiful spring mornings. But I know now that they were at work long before I was up. It takes a great deal of labor to make such a large nest when a swallow's bill is all they have to work with.

In the first place the birds have to pick out the right place for the nest. It must be sheltered so that the rain will not wash it down, and it must be shaded so that their little ones will not be too warm. Birds often start a nest in the wrong place and then give it up and try in another place. But when they find the right spot they must be careful to get the right sort of clay to make the cradle with, or it will come tumbling down to the ground.

Then they must mix the clay with a little sand and work it over till it is moist and soft. When they have got a little ball of it just right they bring it in their mouth and pack it down

on the spot where the bottom of the nest is to be. They start five or six inches below the top of the nest and put on a small layer of little balls against the boards of the barn and then another larger layer above it, with some fine grass or hairs placed in between to make the clay stick better.

You can see in the picture the different layers and the grass and hair hanging down. A layer or two is pretty good work for one day. So that it will take them a week to finish it, even if the weather is fair and no accidents happen. But they do not easily give up, even when accidents do happen. A pair once built a nest under a veranda where a wire bell-rope ran. The bell was not rung very often, but whenever it was rung it pulled the growing nest down. When it had fallen twice the birds rebuilt it in such a way as to leave an open passageway through that part of the nest where the wire was.

When they have finished the clay sides, they get fine soft grass or other fibres and fill it nearly to the top. Then they put in a lining of downy feathers for their little babies to lie on. You can see some of the feathers at the top of the nest, and you can make out three baby heads peeping out of the nest to greet their mother, who has just come to bring them something to eat.

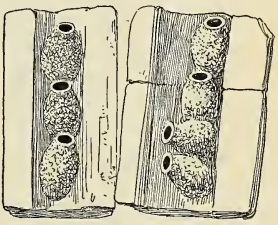


Fig. 12. — Mason Bee's Cells.

But the insect mothers, as well as the bird mothers, cradle their babies in clay. A little green bee, not so large as a house fly, builds a tiny cell of clay for each of her little ones. You see in the picture (Fig. 12) some of the cells made inside of a lock by this Mason Bee. The little mother bee picks out

some safe place and then brings a tiny bit of clay that she has worked over and mixed with a little fine sand and sticks it on the spot she has chosen. Then she gets another bit of clay and lays it down beside the first and presses it firmly against it. So she goes on all day long, bringing a new piece every minute or two and laying it in place till she has finished one of the little earthen jars you see in the picture. But her work is not done yet. She must go to the flowers and gather pollen and honey and mix them together and put them as bee-bread in the cell for her little baby bee. Then she lays an egg on the food and seals up the tiny jar, and when the baby wakes up she finds herself in a jar of honey and begins to eat and to grow.

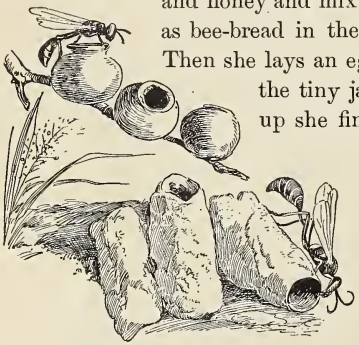


Fig. 13. — Mud Wasp's Nest.

The wasps also make clay cradles for their little ones. The next picture (Fig. 13) shows two different wasps at work on such cradles. One of the nests is round, something like a sugar bowl, while the other is longer. The wasp at work on the longer nest is the South American cousin of the mud wasp that we have everywhere in this country. When I was a boy I used to see them come into the unfinished attic and make their mud cells on the boards and rafters, and this summer I found them doing the same thing up in Wisconsin.

The mother — for it is the mother always that makes the cradle for the wasp babies — finds some sheltered place and brings in her jaws lumps of clay about twice as large as her

head and spreads the soft stuff down on the board. She works as hard as the little bee and soon has a cell between one and two inches long. When she has finished one and filled it with the food her baby likes best, she closes up the end. But she makes that part much thinner than the rest of the cradle, so that the baby wasp will find it easy to get out when he has grown up. Then the mother goes to work on another cell right beside the first one, but she does not forget the first one. While she is away getting clay for the second, if you make a little pin hole in the first, she will at once notice it on her return and use the clay to stop it up, and if you break off a piece she will mend the place.

A man once stuck a tack in her nest while she was absent. When she came back she seemed very much surprised and worried by it. She ran back and forth around it with the bit of clay still in her jaws, as if she did not know what to do! But soon she dropped the clay and took hold of the tack and pulled until it came out. Then she closed the opening once more. Another time when this man broke open one of her nests in her absence, she took out all the food and put in a fresh supply before closing it up. She seemed to think something unusual had happened, and she did not want her baby's food spoiled in any way.

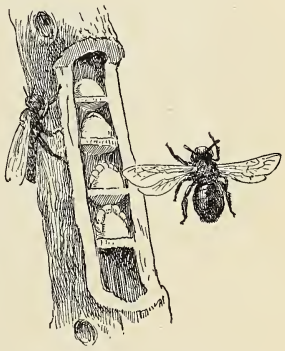


Fig. 14. — Carpenter Bee's Cell.

We have seen how Mrs. Mason Bee packs her baby away in a jar full of honey, and now we have another bee, — Mrs. Carpenter

Bee, — who puts her baby inside the trunk of a tree (Fig. 14). She bores with her sharp mouth right into the wood, and when she has gone in an inch or so she turns downwards. Sometimes she makes a tunnel over a foot long, though it is very slow work for her. It takes her a month to finish her nursery. She has to brush out all of the bits of wood that she bites off, and she generally carries them away from the tree, so that her enemies may not steal her babies by finding out where her nest is from the chips on the ground.

When she has made the tunnel long enough, she goes in search of pollen and honey, like the mason bee, and makes a ball of bee-bread and puts it in the bottom of the tunnel and lays an egg on it. Then she takes some of the little chips she made and sticks them together and builds a little floor above the ball of food. On this floor she puts more food and another egg, and then builds another floor. She does this ten or a dozen times, making a cradle with many stories.

But her work is not over yet. You will see from the picture (Fig. 14) that the lowest baby is the largest, because it is the oldest. So the lowest baby must get out of this many-storied cradle first. Consequently, when the mother has finished all of the floor inside, she goes down the outside of the tree to where the bottom of her cradle comes, and gnaws a hole into the wood to the lowest cell. This hole she stops up with chips stuck together in the same way she made the floors inside, and when her oldest baby is grown into a bee he can gnaw out without any trouble, because he had such a thoughtful mother.

Another bee is still more thoughtful for her young. Mrs. Rose Bee is her name and she lines her cradle with soft green rose leaves. She cuts out little pieces from the leaves of roses, shaping them so that they will just fit the tiny cradle she has

dug out of the wood. She takes from twenty to thirty pieces to line each little cell, and sometimes she has thirty cells in her nursery, making a thousand bits of lining she has cut out and fitted one by one to make her baby's cradle soft and smooth. So you can imagine what a busy little bee she is. Perhaps you have seen her sometimes cutting her bits of lining from your rosebush, or if you have not seen her, I am sure you must have seen the little round scollops she makes along the edges of leaves. She has a cousin who is even more dainty about the lining of her baby's cradle and cuts out bits from the red petals of the poppy to spread inside of her nest.

Fig. 15. — Oak Galls.

But the most wonderful cradle is the one that the gall-fly makes for her baby. You see the fly on the oak leaf in the picture (Fig. 15), and you see the round balls growing on the oak branch. Those round things are called galls, and they are the cradles of the baby gall-fly. One of them has been cut open, and you can see a tiny worm curled up cosily in the middle of it. That is the baby fly. The ball is not only the cradle, but it is also food for the little one — all of the food he needs until he grows up into a fly and leaves his nest. Then he will gnaw his way out, as you see one of the others has already done.

Do you ask me how the fly made this cradle? I cannot tell you. The fly's mother laid her egg in the bark of the twig and then left it there. Then the oak tree went right to work and

built up this beautiful little cradle, soft to lie in and juicy to eat. Did the mother ask the tree to do it? She seemed to know that her baby would be cradled and fed by the tree. She had found it out somehow, just as men have found out that if you put seeds in the ground they will grow up into more seeds. But I do not suppose she said anything to the tree, any more than the farmer says anything to the earth when he puts the seed into the ground. Who then did ask the tree to cradle the tiny baby? and who taught it how to do it so well?

I have gone the whole round of creation: I saw and I spoke;
I, a work of God's hand for that purpose, received in my brain
And pronounced on the rest of his handiwork,—returned him again
His creation's approval or censure: I spoke as I saw.
I report as a man may of God's work — all 's love, yet all 's law.

BROWNING.

TEACHING NOTES.

Children do not as readily as older people get the reality of these galls and clay nests from pictures. A single example will be of great interest. Encourage them to try to obtain one.

Keep the purpose of the nests as cradles in sight, and take occasion to suggest the larger Wisdom and Love that inspires all things.

In preparation for the following lesson let a pea be put in soak in moist earth for a week.

CHAPTER IV.

HOW THE PLANTS CRADLE THEIR BABIES.

THE dear little girl in the picture has picked some of the earliest flowers of spring and has brought them to her mother. She loves them very much, but she loves her mother more than she does the flowers, and she thinks they are the sweetest things she can find to give to her mother. I suppose you can tell me why she loves her mother so much. She is her mother's baby; and her mother has held her in her arms before she could walk, and has made beautiful baby

clothes for her, and the pretty dress she has on now was given her by her mother. So of course she cannot help loving her mother because she is sure her mother loves her. That is the reason why she wants to give her mother the prettiest present she can find anywhere. So when she ran out in the fields to play this bright spring morning and found some early flowers, she thought they were so beautiful that she must give them to her mother.

But I don't suppose you can tell me the reason why the flowers are so beautiful. They are beautiful for the same reason that that little girl is beautiful. They are the babies of mothers that love to care for them, as that girl's mother loves to care for her. The German artist who painted the picture calls it "The First Children of Spring," and he means that the flowers are those "first children." And the flowers really are the children of the plants on which they grow. They are babies held in their mothers' arms; for the leaves and branches are the hands and arms of the plants. But the bright colored leaves of the flowers are not the babies themselves. They are only the baby clothes which the loving mother plants have made to wrap their babies in.

A flower is a cluster of leaves that the plant has gathered into a nest for its little baby. You know how the branches grow where there is no flower. They grow long, with one leaf here and another there. But when a branch is to have a baby on it, it does not grow in length. It stays so short that all its leaves are in one place, in order to make a cradle for the baby. And the thoughtful mother plant loves her baby so much that she is not willing to have it cradled on rough green leaves. She changes those leaves in the cradle from green to red, or white, or some other pretty color, and makes them as soft and sweet

smelling as any human mother could make the clothes of her baby's cradle.

You can see from this picture of a rosebush (Fig. 17) that the colored leaves of the rose, or the petals, as they are called, are really the same as the green leaves. For in this bush, after the leaves had been gathered into a nest, the stalk forgot to stop and went right on growing through the centre of the rose. Above the petals of the rose there are green leaves just as there are below it, showing you that the leaves and petals are the same. And sometimes instead of the pink and white petals of the rose you find greenish leaves right in the rose. I suppose the Rose Mothers all love their babies and are all trying their best to change their leaves in the flower to petals, and some of them succeed better than others, just as some human mothers make better baby clothes than others.

FIG. 17. — A Rose with Rosebush Growing through it.

But the plant does more than just make a nest of soft, fragrant leaves for its babies to lie in. It takes one of its leaves and makes a little cup or basket to pack the babies in, so that they shall not fall out of the nest of petals. If you cut a rose right through the middle, you will see the tiny cup which the rose mother makes for her babies. You see such a cup in the

picture (Fig. 18), and the little round specks at the bottom of the cup are the rose babies. You can find those little cups on the wild-rose bush in the autumn. They are called rose-hips, and look like little red plums or apples, and are about as big as a small marble.

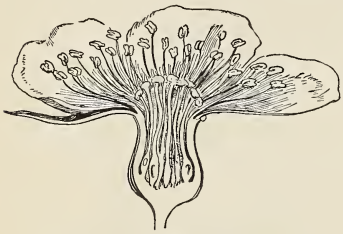


Fig. 18. — A Rose Cut through.

It is not easy for you to see how the rose mother makes a cup out of a rose leaf, because she changes the shape of the leaf so much. But in this picture of the pod of a marsh marigold (Fig. 19) you can see that it was only a leaf folded together, with baby seeds on the edges of the leaf that are inside when it is folded up. You can fold a rose leaf for yourself and see how it is done, just as you see it in the picture (Fig. 20). Or you can take a bean pod, like that in the next picture (Fig. 21), and you will see that it is made of a folded leaf; and when it splits open, it splits into the two halves of the leaf. Sometimes several of such folded leaves are found in the same nest, as you see in the upper part of the picture. Each of them is full of tiny seeds — the babies of the plant. At the bottom of the picture you see another shape that the mother plant folds her leaf into, with a little cap on the cup like a cradle with a cover to it to keep the babies in safety till they get old enough to take care of themselves. Then the mother plant takes off the cover and lets her children out, just as the mother

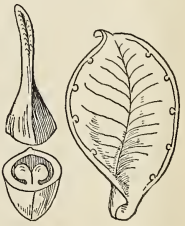


Fig. 19. — Marsh Marigold Seed Vessel.

pea twists open the pea pod when her babies are ready to go out into the world.

Fig. 20.—A Folded Leaf.

If you look at a poppy after the red petals of the flower have fallen away, you will find a little cup with a cover that does not come off. By gently shaking the stalk of the poppy you can hear the seeds rattle inside of the cup. You may wonder how those babies are to get out of their nest that seems so tightly closed. But if you watch the plant some day when the wind blows hard you will see one little seed after another jump out of the cup and alight upon the ground a foot or two away from the mother plant and settle down into the earth to build up a stalk and flower of its own. By looking under the cover of the cup-like cradle you can see how the seeds get out. There are little openings close to the cover just large enough for the babies to creep through. The careful mother makes those openings so that the wind can toss her children out when they are ready to leave, and yet the rain cannot reach them as it might do if she took the cover off altogether.

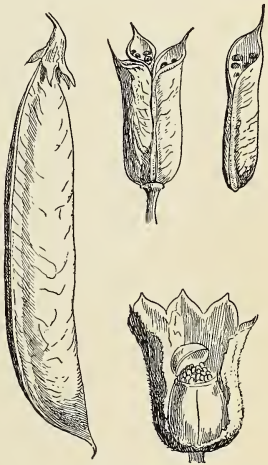


Fig. 21.—Some Seed Vessels.

These are a few of the ways the mother plants have of cradling their babies, and you will find many more everywhere that you look. So you see that all of the beautiful flowers that we love so much are only the nests that plants have made to cradle their babies in.

They are the arms and hands of loving mothers clasping their little ones close to their breasts. We know that we ourselves make cradles for our babies because we love them. "The tender love of human hearts" is what impels us to cradle our little ones. And when we see the birds so fond of each other and of the babies in their nests, we cannot help thinking that the birds, yes, and the insects too, have some of the same tender love for their little ones that we have. But when we see the flowers doing just the same thing for their little ones that we do for ours, can we help thinking that they, too, have something of that same tender love that we feel? and that they are trying to make a beautiful resting place for their little ones as we do for ours?

Fig. 22. — Pea Waking up.

But the Earth itself is a great cradle too. When a plant mother has cradled her little one for a while in the soft, fragrant nest of leaves that we call a flower, she puts her baby to sleep and cradles him again in the dark earth. In the fall of the year you can see ever so many babies lying thus asleep on the ground where their mothers have put them. The next time you go out in the garden where the beans or peas have been growing, look sharply on the surface of the soil and I am sure you will find a bean or a pea lying near the foot of its mother plant. If you find a little round pea like the one in the picture (Fig. 22), you may think it is dead, but it is not. It is only sleeping. It will lie there sleeping soundly through

all the cold weather, wrapped up in a warm blanket of snow.

But when spring comes, if you watch it closely, you will see it wake up. Some bright, warm day you will find it has begun to send its tiny roots down into the ground and its little leaflets up into the air. If you would talk with the pea, I think you would find it was quite a happy little fellow. It would tell you that it woke up in a nice nest with all it needed to eat and drink right about it, and the warm, bright sunshine spread over it. It had only to reach out its little fingers in the ground for food, and open its leaves to get rain and dew and sunshine. It was as well tended as the little baby gall-fly that woke up finding that a big oak tree had undertaken to care for it and was making it a nest that should shelter it and feed it at the same time.

So the baby pea finds that the earth itself is caring for it by making it a nest that holds it safely, and feeds it and shelters it. But out in the lonely forest, too, where there are no gardens with fences to keep the cows and sheep away, and no farmer to plough the ground and pull up the weeds, you would still see the baby seeds waking up in the spring and finding food and drink and sunshine all ready for them. And away up on the mountains the baby seeds of the plants that grow there peep out of their baby clothes in spring and find that they have not been forgotten. And even down in the water of the seashore or lake-side the tiny baby seeds wake up in the spring and find that the same loving care has kept them safe during the cold and is giving them all they need.

So the whole great earth seems to be such a nest, filled with new babies every spring. And the blue sky and warm sunshine seem to be brooding over the earth-nest, like some great bird

tending its little ones. And not only the plants and insects but the higher animals and men are gathered together in that great nest of the earth and brooded over by that sky and sunlight. We should all freeze to death without that warm light, and we should all starve without the earth to feed us in its great cradle. And if our mother cradled us and fed us because she loved us, may we not think that the Great Mother of us all loves us?

Flower in the crannied wall,
I pluck you out of the crannies;
Hold you here, root and all, in my hand,
Little flower — but if I could understand
What you are, root and all, and all in all,
I should know what God and man is.

TENNYSON.

TEACHING NOTE.

The teacher who reads these chapters to or with a class in a public school will readily appreciate that the underlying thought — the Immanence of God in Nature — must not be forced into dogmatic assertion. If kept to the spirit and movement of a fairy tale, with its light touch upon truths too high for stereotyped forms, the effect will be entirely salutary, as in Kingsley's *Water Babies.*

CHAPTER V.

HOW THE BIRDS TEND THEIR BABIES.

"A Kiss First" is what the German artist, Meyer Von Bremen, calls this beautiful picture of his. The little baby has just waked from his sleep in his cradle and he is hungry. His mother has an apple for him in her hand, but she says he must give her a kiss first before he can get the apple. I don't suppose she would starve him even if he should not give her the kiss, for she cared for him long before he could pay her by even a kiss. She has fed him and washed him and clothed him, not for the sake of kisses, but just because she loved him, and she would go on caring for him as long as he needed her care.

And the mothers among the birds show the same unselfish, loving care for their children. You must have often seen how watchful the hen mother is of her little brood. She keeps them close to her by day, and under her wings at night. She takes them about with her to get their food, and scratches up the ground to help them find it. One mother hen was found one day on the other side of a deep stream with all her chickens about her, and at night she was found back in the yard with her brood. Her owner wondered how she managed to get her babies across the water, and so he watched her the next day. She went down to the edge of the water, and sitting down, clucked to her chickens. They all came up to her, and one of them — the bravest, perhaps — jumped on her back. Then she got up carefully and spread her wings, and actually flew over the water with her baby on her back. When she had alighted on the other side and he had jumped off to the ground, she left him and flew back to the rest of the little flock and took another in the same way; and

Fig. 24. — A Hen Driving away a Hawk.

so she went on till she had carried them all over. Was not that a pretty good mother?

But she is as brave as she is thoughtful. If you try to take one of her baby chicks, she will fly at you and try to strike and peck you. She will fight anything that seems to threaten harm to her loved ones. She will fight a hawk, as you see her doing in the picture (Fig. 24), and drive him away, though she would run away herself if she did not love her little ones so much. It is her love that makes her brave.

> The bravest are the tenderest,
> The loving are the daring.

But the most thoughtful bird mother that I know of was a goose which Franklin tells us about. He says that this goose had made her nest in the kitchen of the farmhouse, and that she was the only one of the fowls that came in there to nest. But after she had been sitting on her eggs a few days, she was seen to leave them and go out of the room and waddle slowly to the yard where the rest of the geese were. There she went up to a younger goose and after some quacking, she turned and walked back and the other goose came with her. She came into the kitchen, followed shyly by the other goose, who had never been in the room before. Then the older

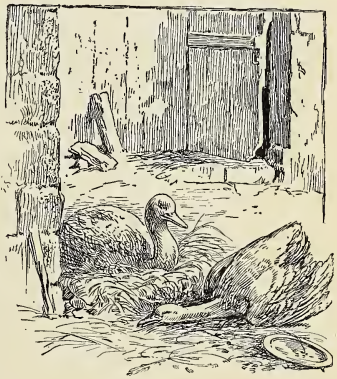


Fig. 25.—The Dying Mother.

one went up to the nest, but lay down on the ground beside it, as you see her in the picture on the preceding page (Fig. 25), while the younger one climbed into the nest and sat down on the eggs. In a short time the mother goose was dead, while the other remained and hatched the eggs and brought up the brood. The mother's love was strong even in death ; and when she felt that she could not live, she made up her mind that her babies should live, if she could get any one to take her place.

But when the little ones come out of the eggs, the birds are busier than ever. I wonder if you know how many times a bird mother feeds her babies during the day. Of course she has her husband to help her, but even then she is kept very, very busy. I sat for five minutes in a boat under a cliff swallow's nest this summer, and the parents came twice in that time to feed their little ones. They flew in so swiftly and stopped so short a time and went darting off again in such a hurry that I really pitied them, if they had to keep it up all day long. And men who have watched birds all day say that they are just as busy from before sunrise till the sun sets again. If the mamma and papa birds come every three minutes, that would be twenty times an hour and three hundred times a day. Your mamma and papa would be pretty tired if they had to feed you three hundred times a day. To be sure, there are three or four birds in every nest, so that would be only about one hundred times for each birdie. But even that would be a good many meals a day.

You see in the picture of the tailor bird (Fig. 26) two little open mouths waiting for the worm their mother has found and brought to them. She and her husband had to spend a great deal of time in making that fine nest. In the first place they hunted up the strands of cotton fibre that grow on the plants, and

twisted them into a string with a knot at the end. Then they held the edges of two leaves together and made a hole through the leaves with their sharp bills and pushed the strand through at the same time. You see how nicely they have done it, both in the front and the back of the nest. Then they had to find a lot more of the soft vegetable fibres for the birdies to lie on. You can see them sticking over the edge of the nest. When they have done all that and have hatched out those two baby birds, then their hardest work really begins, for they must hunt near and far to find nice food to fill those two hungry mouths.

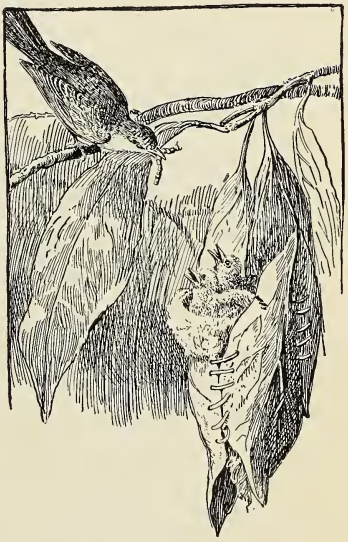


Fig. 26. — The Tailor Bird and her Young.

But I suppose they like to do it because they love their babies, just as a human mother likes to feed her baby even if she has to work hard to do it. The birds will keep on feeding their little ones even if you are cruel enough to take the baby birds from the nest and shut them up in a cage. In the picture on the next page (Fig. 27) you see two blackbirds, of the kind that live in Europe, trying to put food through the bars of the cage that shuts their babies in. The father and mother had built their nest in the garden, and after their babies were nearly ready to fly, the owner of the garden thought he would capture

the little ones and tame them. Mr. and Mrs. Blackbird were frantic when they saw the man come to their nest. They flew at his face and tried to drive him away, but he was too strong for them. He took their four little babies and shut them up in that cruel iron cage, where they cried piteously. The father and the mother tried in vain to free their captive children by throwing themselves against the iron wires. When they found that the wires would not break, they flew off sadly, and the man thought they had deserted their babies, but they had not.

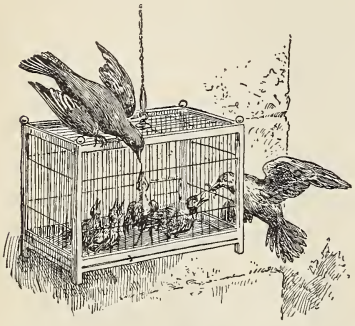


Fig. 27. — European Blackbirds Feeding their Young in a Cage.

They had only gone to get some food, and you can see them reaching it in through the bars of their prison. But they could not care for their babies very well through the wires, and in spite of all that they could do to help them, the little creatures drooped, and in a day or two their cruel jailer found them lying dead in the bottom of the cage. It was over in France that this sad event happened. But here in America a man did the same thing to some young birds. But when their parents came and fed them, they sat down beside the cage and wailed in such a heart-broken way that the man was touched at last, and he opened the cage to let the little ones out. And you should have seen what a glad family they were.

But the birds do more than feed their little ones, as you will see from the next picture (Fig. 28).

When the bough breaks the cradle will fall
And down will come baby, cradle, and all,

is the way the rhyme goes, but you will see from this picture that this is not the way things go in Birdland. Mr. and Mrs. Goldfinch — the European cousins of our goldfinches — do not intend to have their cradle and their little ones fall to the ground, even though the branch that holds the nest does break. They thought they had picked out a good tree for their home. They spent several days looking everywhere. It was their first experience in making a nest, and so it was not easy for them to find just what they wanted. So Mr. Goldfinch suggested to his wife that, while she was resting, he should go by himself and search farther than they had gone before. In a short time he found what seemed the very tree wanted. He hurried off to bring his mate, and they came flying back together. Then the little lady perched on the spot her husband pointed out to her, turned around in it to take its measure, looked at the leaves above it to see whether they would keep the rain and sun away from her and her little ones, and then flew around the tree to see what her neighbors were like. All the time they kept up a constant murmur of pleasant twitterings, as they talked it over.

Fig. 28. — Mending a Broken Bough.

Everything seemed just right, and they set about making their nest at once. When it was finished, the little lady bird sat brooding over the eggs for nearly a fortnight, while her bright husband sang sweetly to her from a neighboring bough, when he was not hunting through the town and country to find food for her. And at night he sat perched on the branch beside the nest, whispering words of love to her, no doubt. But when the little babies came out of the shells you should have seen how proud and busy they both were. But they found, as their babies grew heavier day by day, that the branch settled lower and lower. It was a terrible day when they discovered that the bough was actually breaking. But Mr. Goldfinch loved his children very much, and as he was a brave, ingenious bird, he determined to tie the sinking branch to another stronger one not far away. And you see him in the picture pulling the strong branch up to the nest while Mrs. Goldfinch is tying it to the nest with fibres. And so the cradle did not fall.

I know not where his islands lift
  Their fronded palms in air,
I only know I cannot drift
  Beyond his loving care.

WHITTIER.

TEACHING NOTES.

The ways of nesting birds make interesting conversational lessons. Get the pupil to tell the class any instance of mother-love they know among the lower creatures, and to match it by human mother-love. Lead them to think where the first mothers got their love.

For the evolution of high qualities, Drummond's *Ascent of Man* will be suggestive to the teacher.

CHAPTER VI.

HOW MAMMALS TEND THEIR BABIES.

THE French artist who painted this picture calls it "Motherhood." He seems to think that the cow is a mother to her calf, just as the human mother is to her baby. You can see from the mother's face how much she loves her baby and how tenderly she cares for her. Though the mother herself is barefooted, she has taken her baby up in her arms so that she may not hurt her little feet on the hard road or get tired with the long walk. And I should not be at all surprised if she thought her baby was the sweetest and brightest and prettiest baby in all the wide world.

And I feel sure that the mother cow thinks the same about

her calf, because she cares for him so tenderly and faithfully. She cannot carry him in her arms, but she takes just as good care of him as she can. She cleans him whenever he gets soiled in any way and feeds him when he is hungry, and she hides him carefully away from any one that she thinks intends to take him from her. A farmer told me this summer of a bright cow who hid her calf from him. The cow mother was shut up in a small pasture and the farmer looked all over the pasture but could not find any trace of the calf. He was sure the cow had her baby there somewhere and so he pretended to go away, but remained near enough to watch her; and soon he saw her go to a little clump of bushes and low softly, when out came her calf. The bright little fellow had kept perfectly still while the farmer was hunting all about him and almost stepping on him, because his mother had told him to, I suppose.

It almost breaks the heart of a cow to take her calf away from her. She will call for her baby in the most pitiful tones and she will go almost any distance to get back to her child. I remember in my boyhood going five miles to get a cow that had gone that distance to be with her baby. She had been sold and driven five miles away from her child and shut up in a stable, but when we went out to the stable in the morning she was missing. She had managed to work the door open in the night and had gone straight back to her calf, where we found her the next day.

But she will go much more than five miles to find her baby. A Frenchman says that during the last war the Germans drove the cattle away from the farms, and from one farm they took a mother without her calf. She refused to go, and they could make her move only by cruelly pricking her with their bayonets. They drove her many days' march in this way, till at last she

was able to steal away from them one night. Then she came straight back the weary miles she had been driven, without stopping to eat or drink, till she reached the farm, when she rushed through the yard into the barn where her calf was, calling it loudly on the way. She had been gone so long that the calf had forgotten her, and her milk had dried up so that she had no food for him. But she kissed him so tenderly and cared for him so constantly that he began to love her as much as ever.

But other animals care for their babies just as well as the cows do. I am sure that you have a cat or a kitten at home,

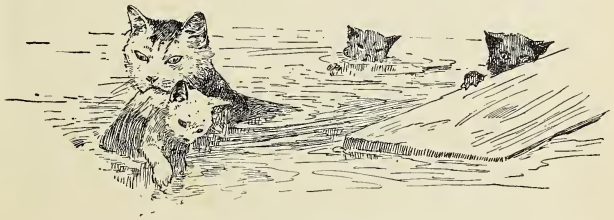


Fig. 30. — Cat Saving her Kittens.

and most of you have seen how fond the mother cat is of her kittens. But I do not believe you ever saw the cat jump into the water, as you see her doing in the picture (Fig. 30). She hates water worse than anything else in the world, yet a mother cat actually sprang into a stream and swam out into the deep water to save some of her kittens who had tumbled off from a plank into the water. She was a brave mother, was n't she?

And she is as tender and loving as she is brave. If she thinks her kittens are in danger, she will hide them so no one can find them. I heard of a cat mother whose kittens disappeared from her home when a new dog came there to live, and

it was found that she had carried them to a neighbor's barn two miles away. As she had five kittens, the mother must have traveled twenty miles to get her babies in safety. Another cat, who had her kittens in a shed, carried them off when a rough boy visited the family. During the whole week of his stay no trace of them could be found, though their mother came regularly to get food. But the rough boy had been gone hardly an hour when puss came bringing her kittens back one by one. Another cat, who had but one kitten, was seen to jump up, with her kitten in her mouth, from the basement floor to an open drawer some feet above the floor, and put her little one in the drawer. Then she sprang back again and gave battle to a huge rat, larger than her kitten, and after a hard fight she killed it. Then she jumped up to her kitten with a pleasant call and took her back to her bed on the floor.

But a cat shows her kindness of heart especially in the way she will care for the kittens of other cats. She will even go and find motherless kittens to tend. We had a very bright cat once — a cat who used to unlatch doors, ring door-bells, and open slides in the pantry. She came to me once and acted so excited and so eager for me to go with her that I followed her out of doors and then into the stable. She took me to one corner of the stable, where she lay down beside three little kittens about a week old. She had no kittens herself then, and so she had no milk for these little strangers, and she jumped up and came to me as soon as they tried to nurse. She evidently wanted me to get some milk for them and I did it, much to her relief. I found she had brought the kittens from a house in another block, where they had been crying for some time. Our tender-hearted cat had been touched by their cries and had done all she could for them.

The tiger, too, is a cousin of our cat and she loves her babies as our cat does. Some people in India found five little tiger babies left alone by their mother while she sought food for them. The men took three of the babies, thinking she would never miss them, and if she did that she would stay with those that were left. But soon they heard the terrible roar of the mother, and they were so frightened that they opened the door of the building where the little ones were, and their mother carried them off one by one, as you see her doing in the picture (Fig. 31).

FIG. 31. — Tigress Rescuing her Children.

Another way of caring for the babies is the way Mrs. Opossum is doing in the picture (Fig. 32). She has a little bag right underneath her body, and she puts her babies in there when they are first born. They are very tiny then and stay in the bag nursing and growing for several weeks. But when they get large enough to use their feet they come out of the bag and climb up on their mother's back, and you see how they fasten themselves there by twining their little tails about her large one, which she

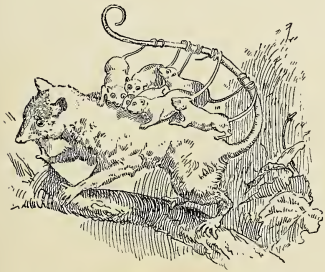


FIG. 32. — Opossum Mother and her Children.

bends over her back for them. So she can carry them around with her wherever she goes.

In the other picture (Fig. 33) you see another mother carrying her child on her back. It is a big mother with a big name. Hippopotamus is what they call her, — a word that means River Horse, — and she is more than ten feet long. She lives in the rivers of Africa and likes to wade and swim in the water.

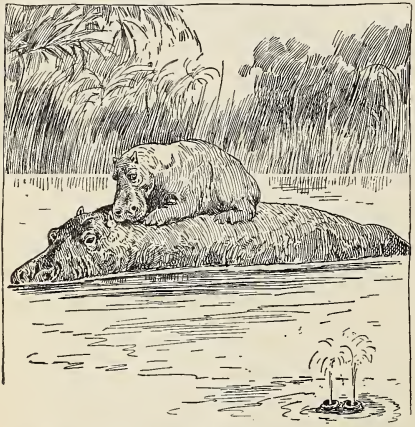


Fig. 33. — Hippopotamus Mother and her Child.

She will stay under water four or five minutes at a time, and then just stick her nose out of the water to breathe, as you see one doing right at the front of the picture, where the air is blowing up two little jets of water. But when she has a baby she comes up much oftener to let him have plenty of air, and she carries him about on her back, as you see her doing in the picture. He does not look very pretty to us, but she seems to think a great deal of him. She makes a soft place in the rushes for him to lie in when he is too young to go with her, and when he is older she keeps him with her and guards him against every danger. She will even attack men when she has her baby with her, though she will run away when she has no baby. One of these great creatures rushed upon a traveler in Africa recently,

and his negro guide told him that she must have a calf close by, and sure enough they found a baby hippopotamus hidden away on the bank. She was determined no one should disturb her baby.

In the next picture (Fig. 34) you see a poor bear mother who has lost both of her babies at once, and she feels very badly over it, for she loved them dearly and cared for them tenderly. She had made a warm nest for them down deep in the snow, by lying close against a cliff and letting the snow fall over her till it buried her all up except a little breathing-hole. In this snow home the mother and her two babies passed the cold winter. But when spring came the baby bears were large enough to go about with their mother and eat the food she got for them. But once she found some walrus flesh close to an ice-bound vessel. She tore off some small pieces and gave them to her babies, but they had scarcely eaten the meat when some sailor fired at them with a gun from the deck of the vessel and killed both of the little ones and wounded the mother also. When she saw her babies lying motionless she went to them and patted them with her paws, and with coaxing tones tried to get

Fig. 34. — Mrs. White Bear and her Children.

them to come to her. Then she brought some more meat and tore it up and laid it beside them. When she found that they took no notice of that she went away some distance and then turned and began to call them in the most tender way to follow her. She did this twice, and when she found nothing could stir them, she went back to them and kissed them and caressed them with her paws, wailing as if her heart would break.

Another white bear mother was more fortunate with her little ones. When she found that the men on a vessel were trying to shoot them she urged them to run away as fast as they could; and when they grew tired she went behind them and put her long flat head under the body of one and then the other and threw them ahead over the ice, and so escaped.

A thread of Law runs through thy prayer,
Stronger than iron cables are;
And Love and Longing toward her goal
Are pilots sweet to guide the soul.

WASSON.

TEACHING NOTE.

Trace the impulse of love, like that of human parents, in all this care of helpless offspring, and keep strongly in the children's minds the motto: Love is a safe pilot of the soul.

CHAPTER VII.

HOW FISH, REPTILES, AND SPIDERS TEND THEIR BABIES.

THE little girl in this picture seems to be giving her doll a bath. I suppose she knows that her mother gives her a bath because she loves her, and so she thinks she will show her love for her doll by giving it a bath. But I fear she will find that the bath will do her doll more harm than good, because dolls are not made to put in the water. It spoils them to wet them. If she only had a doll-baby that the water would not injure, she could put it in the water all she wanted to.

There are such water-babies in the world — real live babies, not merely dolls. In the first picture (Fig. 36) on the next page you can see a lot of such babies following their mother about in the water. They are fish, and their

mother, whom the fishermen call a lumpfish, is very fond of them. I suppose you do not think she looks very pretty, but I dare say that her babies think she is a very pretty mother, because she takes good care of them. She and her husband watch the tiny eggs before they are hatched, and the father covers them over with his big body so that no harm shall befall them. When the little water-babies have come out of the eggs and are able to swim, they go wherever their mother goes, playing about her in the merriest way, and cuddling up close to her if they see anything that frightens them.

Fig. 36. — The Lumpfish with her Children.

Mrs. Lumpfish and her babies are found in the ocean off the coast of Maine, but in our fresh-water streams we have fish mothers who tend their water-babies in the same way. We sometimes see the sunfish and her brood swimming about as Mrs. Lumpfish does. A gentleman once held his hand in the water as Mrs. Sunfish and her babies came along. The mother stopped when she saw the fingers. She evidently knew what a hand was, and that there was probably a man back of it, and she had learned to be afraid of a man. But her little water-babies came swimming fearlessly up to the hand and began to nibble the fingers to see whether they might not be good to eat. The mother was very much worried by the careless way her

children behaved, and moved nervously about at a distance from them. But when the man began to slowly close his fingers over the little fish, as if he would catch them, the mother could stand it no longer. She rushed at the man's hand so suddenly and hit it so hard that she startled him so that he lost his balance and almost fell into the water. She might be afraid of a man, but she was n't going to let him steal her babies if she could help it.

But fish have other ways of keeping their little ones safe. Sometimes the parents will take the children all into their mouths, as you see them doing in the second picture (Fig. 37). Ophiocephalus is the long word the scientific men have given to these fish, a word made up of two Greek words meaning "snakehead." So we will call them Snakehead for short. Mr. and Mrs. Snakehead seem to think a great deal of each other, for you generally see them together. They build quite a nice nest for their babies, using straw for the frame, and covering the straw over with mud.

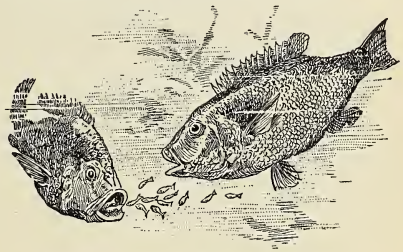


Fig. 37. — Ophiocephali and their Young.

The father and mother watch over the little ones very carefully and do not allow them to come out of the nest till they get strong enough to swim quite well. Then they go around with their brood, and if they see a dangerous fish or a man's hand, they open their mouths and in half a second all the tiny fish have disappeared, stowed safely away inside their parents. I suppose if the parents had any arms they would use them to hold their

children, but as they have n't any arms, they make their mouths do instead.

They use their mouths also to make their children mind, not by scolding them as we sometimes do, but by catching them in their mouths. Among the Sticklebacks, I believe, the father alone tends the babies, and he tries to keep them in the nest, or close to it, because if they get away beyond his reach they will be eaten by some big fish or other. So when Mr. Stickleback sees one of his numerous children going away too far, he rushes after him and opens his mouth and takes him in. Then

Fig. 38. — Alligator Mother and Children.

he turns around and squirts the little fish out toward the nest. And if the little fellow does not take the hint even then and stay at home, the father will shut him in the nest by pulling the straws down over the opening. So you see what a busy time of it a fish father or mother must have with a hundred children to look after, when they all like to play and get into mischief as much as you do.

But fish are not the only water-babies by any means. The Alligator is another mother who takes her babies in the water, though they are born on the land and breathe air, as you and I do. The mother makes a nest for her eggs, for she lays eggs like a bird. She brings sticks and leaves in her big mouth to

some safe place among the reeds on the bank of the river, and when she has laid her eggs she covers them over with more leaves and stays by them to keep them from harm. When they are hatched she leads the little alligators to some quiet little pool with sunny banks of sand for them to play in and bask on; and if you should steal softly to the place without frightening her, you would see her lying, as she is in the picture (Fig. 38), with her babies climbing all over her in a slow, sedate sort of sport. But the moment they heard you they would all scramble into the water and vanish from sight. If the little ones were too small to take care of themselves and get out of danger, she would open her big mouth and take them out of harm's way, just as the fish do. A man once found a lot of baby alligators on the bank of a river and took one of them to carry home with him. But he had hardly picked it up when the mother alligator lifted her head from the water and bellowed at him, and in half a minute a dozen other big heads were lifted out of the water, all barking and snapping at him and all making their way towards him. So he was glad to drop the baby alligator and hurry off beyond the reach of its angry mother and her friends.

Fig. 39.—The Alligator Defending her Young.

You can see from the other picture (Fig. 39) how carefully the mother alligator protects her babies from the birds that would eat them. The bodies of the little alligators are soft and tender, not hard and scaly like their mother's, and so the hawk likes to get a baby whenever he can. This time the mother seemed sleeping on the sand with her little ones playing carelessly about her. But if she was asleep she woke up very quickly when she heard the sound of the hawk's wings, and you see she is gathering her little ones close to her and is facing the hawk. He will have to eat her before he can eat her babies.

Fig. 40. — Spider Mother and Little Ones.

A mouth may be a safe place for babies, but I should think a tent would suit the babies better, and so I suppose that those baby spiders in the next picture (Fig. 40) must be having quite a jolly time, for they are living in a tent made of silk. You can see their mother sitting inside the tent, while her little ones are running all around, and one of them has spun a thread and let himself down from the oat stalk on which the tent is pitched. And where do you suppose the tent came from? Mrs. Spider made it all herself. She spun the silk and wove it together and pitched it in the branches of the stalk of an oat plant. When she made it for her babies it did not have that large opening in it. A man tore it open to see what was inside, and as soon as she could she closed it up by weaving some more silk over it.

A lady here in America found a tent something like this,

only it was made of two smilax leaves fastened together by the silk threads of the spider mother. The mother was away from home when the lady discovered the nest. So she pried it softly open, and many of the little spiders came running out, like children out of school. Soon Mrs. Spider came home and seemed greatly surprised at what had happened. First she tried to pull the tent together again by spinning threads from one leaf to the other. But she found that this was going to take so much time that her children would get lost unless she looked after them first. So she ran about gathering them in one after another, bringing some of those who had strayed farthest in her mouth. The lady put her pencil in, and the spider sprang at it and then at her hand, evidently thinking that this strange creature wished to harm her babies. Three days later she came and pulled the tent open farther. This troubled Mrs. Spider very much, and she ran all about the place in an angry, excited manner, as if trying to find the cause of the harm. Then she went to work in the most determined way to close up the opening, and the next morning it was all repaired. The industrious little mother had made her babies' tent all right again.

She also feeds her babies as well as shelters them. If you find a nest without the mother and stay to watch it, you will see her come back bringing a fly in her mouth. She will settle down among her babies, and half a dozen of them will begin to eat the fly with her. I found such a nest one morning this summer and dropped a fly into it, within reach of the mother. She sprang upon the fly and dragged it among the little ones and held it fast while her babies gathered about and began to eat. With a hundred babies to feed and care for, she must be quite a busy little mother and has to work hard, no doubt.

But if she loves them, I suppose she enjoys working for them, as your parents enjoy working for you.

And there is never a leaf nor a blade too mean
To be some happy creature's palace. LOWELL.

Let me go where'er I will,
I hear a sky-born music still:
It is not only in the rose,
It is not only in the bird,
Not only where the rainbow glows,
Nor in the song of woman heard,
But in the darkest, meanest things
There alway, alway something sings.

EMERSON.

TEACHING NOTES.

Attention is again called to the use of the picture at the beginning of each lesson. They are reproductions from reliable if not celebrated artists.

The truth in Emerson's fine lines should be dwelt upon to suggest the unity of all life.

A few sprouted kernels of corn will be needed for the next lesson.

CHAPTER VIII.

HOW MOTHER NATURE SETS THE TABLE FOR BIRDS.

I DO not believe that this little girl's mother is in the room, for if she were, she would not let her little daughter feed the cat on the table and out of the same spoon she herself uses. The mother would say that she set the table for her own family, but not for cats and dogs to eat from. She will give the cat and the dog something to eat after she and her family have finished their dinner. But if she allowed cats and dogs to help themselves first, it is very likely that there would n't be anything left for her and her family. Certainly there would not, if she let all the cats and dogs in town eat first. And if every mother let all the cats and dogs in the world help themselves first, there would not be any food left for boys and girls,

and men and women anywhere, and they would die of hunger, and this world would be filled full of cats and dogs instead of men and women and dear little girls and boys. And that would be very bad, would n't it?

So you see we have to set the table for ourselves and keep the cats and dogs away till we have eaten what we need. Then we can give them what we have left and set their table on the floor, as it were. But who sets the table for all the creatures which do not live in our homes and share our food, like the squirrels in the woods, and the birds and the butterflies in the air, and the fish in the water? You know we buy our food at the meat market and the grocery store, or if we live on farms, we raise it by planting seeds in the ground, or feeding poultry and cattle to use on our own tables. But where are the meat markets and the grocery stores of the birds and fish and insects? And where are their farms? And who plants them and cultivates them? I suppose there are at least a thousand times as many other creatures in this world as there are men and women and boys and girls, and so there ought to be a thousand times as many stores and farms to furnish them with food, and a thousand times as many tables set morning, noon, and night. Just think what a lot of housekeeping must be done by somebody!

For a week or two this summer I was where I saw some of this housekeeping done. I lived where I could almost step from the door of my room to the top of a cliff overlooking long stretches of quiet water. On the face of the cliff, right under my feet, were dozens of swallows' nests; and whenever I went to the top of the cliff I used to see the swallows sweeping swiftly back and forth over the still water. What do you think they were doing? If you will look at the picture of the

swallows at dinner (Fig. 42), you will see what they were about. They were catching flying insects. I could not see anything but swallows from the top of the cliff, but as soon as I went down to the edge of the water I was surrounded by a perfect cloud of hungry mosquitoes, eager to eat me up. And the birds were eating those mosquitoes up. That was their breakfast and dinner and supper. That quiet water was the table set for them. It was sending up out of its depths a stream of dragon flies, mosquitoes, and other winged insects. And all that the birds needed to get their food were wings swift enough to overtake the insects, and mouths opening wide enough to take them in, so that they could scoop up insect after insect, till each bird packed hundreds away in his mouth. If you could catch one of the swallows when he has been taking his dinner in this way and open his mouth, you would find a round, solid mass of insects in the back of his mouth, something like a marble in size and shape. That is his share of the dinner set on this watery table, and he had to earn it by hard work.

FIG. 42. — Swallows at Dinner.

In the next picture (Fig. 43) you see another family of birds at dinner — the woodpeckers. On this same cliff from which I watched the swallows, there was a pine grove; and sometimes I would sit down on the carpet of the pine needles for half an hour. As soon as I got quietly seated, I would hear a

knocking, as if somebody wanted to come into my pine room; and looking in the direction of the sound I would see a greenish bird — a cousin of those in the picture — climbing rapidly up and down one of the pine trees, and stopping every second or two to give a few knocks with his sharp bill upon the trunk or branches of the tree. When he had gone over one tree he would fly to another, till he had visited sometimes a dozen in as many minutes. That was the Green Woodpecker getting his dinner. The pine grove was his dining-room, and not his alone, but the dining-room of all the green woodpeckers in the forest. For nine came, one after another, within half an hour the first time I went there.

Fig. 43. — Woodpeckers at Dinner.

They have a sort of pine table for their dinner. Instead of its being flying food spread over the water, it is creeping food hid away in the wormholes of the trees; and the birds must have a pretty sharp bill to get it out, as you see from the ivory-billed woodpecker in the picture (Fig. 43). They use their heads and bills as a sort of pickaxe to pick the bark off, and drill a hole into the hard wood where the worm is. And if they cannot quite reach the worm with their bill, they have a long tongue to thrust into the hole and stick fast to the worm and draw it out. This ivory-billed bird is so large and strong that he

will sometimes knock an old tree trunk all to pieces to get out the worms.

They are hammering and chiseling all day long, hunting for food. You will see one of them strike a tree, and then listen with his head tipped over on one side. If he hears a worm stirring inside the tree, he chisels straight into it and gets it. But if he hears nothing he hops to another hole and strikes and listens once more. And so he works from morning to night, finding his table set for him as the swallow does, but finding that he must earn his food before he can get it.

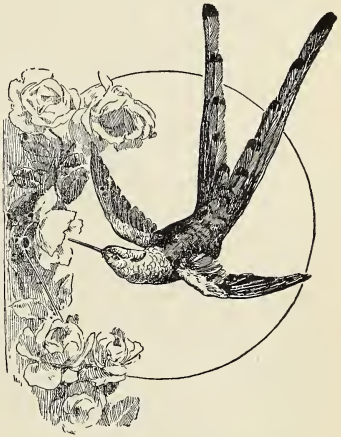


Fig. 44. — Humming-Bird at Breakfast.

But the humming-bird has a nicer table than either the swallow or the woodpecker, for his table is set on flowers and in them. You see from the picture (Fig. 44) that his bill is long and slender, and just fitted to reach into the flowers to the very bottom; and he has a dainty little tongue that he can thrust out beyond the end even of his long bill. He darts from flower to flower, pushing his slim beak into each and sweeping off the tiny insects that live inside of the flowers; and along with the insects he takes a sip of the honey that is found deep in the flower. So he has something to drink as well as to eat, and he seems to like the honey best. A gentleman tells us how he caught one of these beautiful birds

one day and how it pretended to be dead. He says: "It lay on my open palm motionless for some minutes, during which time I watched it in breathless curiosity. I saw it gradually open its bright little eyes to peep whether the way was clear, and then close them slowly as it caught my eye upon it." But when a mixture of sugar, honey, and water was brought and "a drop was touched upon the point of its bill, it came to life very suddenly; and in a moment it was on its legs, drinking with eagerness of the refreshing draught from a silver tea spoon." It was so fond of the drink that it would come from any part of either room and alight upon the cup containing it. It came back after it was allowed to fly away, and even a year later returned with its mate to get some more of the sweet drink. It liked to have its table set for it without the trouble of going to so many flowers.

Fig. 45. — A Pelican at Dinner.

The water also is filled with food for the birds. In the picture of the pelicans (Fig. 45) you can see the tail of a fish sticking out of the mouth of the further one, and you can see what a big bag the bird has under her chin. That is her fish basket and holds almost a pailful of water. When the pelican is hungry she goes flying out from the land and hovers over the water till she sees a fish. Then she sweeps down from the air

into the water with her great mouth wide open and scoops up the fish, or a dozen of them if she can find as many together. When she has caught enough she goes flying home again with her fish basket well filled and sits down on the shore and dresses her feathers, as you see one of them doing in the picture. But as soon as she has digested her meal she has to go fishing again for another meal. So you see she earns her food as much as the other birds do.

Fig. 46. — Bobolink at Dinner.

There are birds that get their food out of the ground as well as out of the water. You must have often seen the hens scratching up the earth and picking bits of something from it. Sometimes you will see the robins on the lawn, especially in the early morning, pulling and tugging at something in the ground. If you watch one of them closely enough, you will see him, after a hard pull, pick up an angleworm and fly off with it wriggling in his beak. Some one who watched a pair of robins that had a nest in sight says that they brought three thousand earthworms during the time they lived in their nest.

In the last picture (Fig. 46) you see the bobolink, whose bright colors and gay song make him such a delight to us all. You will see him swinging on a thistle or any other weed strong enough to bear him, and eating the seeds and caroling his merry

song. He finds his table spread with the seeds of the grasses and thistles and dandelions, and all the other weeds. It almost seems as if the weeds planned to furnish the birds with seeds, for each weed, like a thistle or dandelion, produces hundreds of seeds. One of those seeds is enough to start a new thistle or dandelion, and the other ninety and nine can be eaten by the birds. And all over the earth plants and trees are thus making seeds each year and setting the table for the birds.

So you see that the birds find their table set everywhere—in the air, in the water, in the earth, in the wood of the trees, and in the seeds of the weeds. All the birds have to do is to get the food thus spread for them.

Doubt not, so long as earth has bread,
Thou first and foremost shalt be fed;
The providence that is most large
Takes hearts like thine in special charge,
Helps who for their own need are strong,
And the sky doats on cheerful song.

EMERSON, *The Titmouse.*

TEACHING NOTE.

The presence of love and care even where there is no actual mother leads the thought to the great Caretaker for all things.

CHAPTER IX.

HOW MOTHER NATURE SETS THE TABLE FOR REPTILES, FISH, AND SPIDERS.

I DO not think that this little girl ever saw a toad at dinner before, she appears so surprised and interested. And her friends

seem surprised, too. The kitty looks as if she thought it was hardly a safe place to be in, and I fear she would run if the

toad should hop. But the dog is not afraid. He is ready to jump at the toad if that strange creature should offer to hurt his dear little mistress. I suppose that the toad is surprised, too, to have three such strange visitors at dinner, for he seems to have puffed himself up, as toads do when they are frightened at anything.

But where is his dinner? Can you see it? It is that fly on the ground two or three inches in front of him. But how is such a slow, clumsy creature as a toad to catch such a lively thing as a fly? If you watch him carefully till he gets over his fright, you will see how he does it. He fixes both of his eyes upon the fly as it moves toward him, and the moment it gets within a couple of inches of his head, he opens his mouth suddenly and darts out a long tongue that sticks the fly on the end of it and thrusts it down his throat. And then he shuts his mouth again. He does it all so quickly that you can hardly see his tongue at all. It looks as if he just opened his mouth and the fly flew in of its own accord.

That is the way Mr. Toad eats his dinner. He finds the garden full of insects, — beetles, ants, moths, caterpillars, spiders and everything else, — and he thinks that they have all been made for him to eat. I dare say he imagines the garden to be a sort of table set just for him alone. And so he digs himself a little home under one of the flat stones you see in the picture, in a dark corner of the garden, and sits dozing quietly all day long. But with evening he comes out to dine. He moves slowly along from one part of the garden to another, often stopping still quite a while and opening his large mouth and snapping up an ant and a beetle and a moth, and a lot of other insects as they happen to come within reach of his long tongue. But as soon as it grows light, he goes back to his room under

the stone and takes a good long nap and digests his dinner and gets ready for another the next night.

So he goes on from spring till fall. But when the cold weather comes and all the insects are gone, he takes a nap that lasts night and day right through the winter, till another spring comes with more insects. Then he wakes up again and begins to dine on the insects once more. I fear the insects would eat our gardens all up if it were not for the toads. We do not see them very often, because they are not apt to come out by day, unless it is in rainy or cloudy weather. Their eyes do not look very sharp, but they can see in the night to catch even the smallest insects. But when the toad loses one of his eyes he can no longer see to hit the insects with his tongue.

There was a toad once that had his home under a doorstep for thirty-six years, and the people who lived in the house treated him so gently that he became tame enough even to come into the house at night and sit on the table and catch the insects that were drawn by the lamp. But the people had also a tame raven. And this bird was jealous of the toad, seeming to think that the people liked him more than they did her; and she used to peck at him with her sharp bill, and at length put out one of the eyes of this poor old toad. After that the toad could not often hit the insects with his tongue, and so he slowly starved to death. For a toad will not eat any insects that you have caught and killed for him. Another thing a toad will not do is to quarrel with another toad over their food. Perhaps they think they have enough for all.

The fish also sit down to this table of flying insects, which we have seen set for the birds and the reptiles. Of course when an insect falls into the water, the fish can get it without much trouble. Or they can even jump out of the water a little

way and catch them, as we often see them doing. You know that the fisherman uses an artificial fly — something made to look like a fly — to catch the fish with. He makes it skim over the water, and the fish down under the water think it is a real fly, and spring up and snap at it and so get caught on the hook.

But there are fish in the Old World which can actually squirt water from their mouths at the flies on reeds or rushes beyond their reach and so sweep them into the water, as you see one doing in the picture of the Archer-fish (Fig. 48). A European, who was in Java and heard that the fish shot the flies in this way, got several of the fish and kept them in a vessel where he could watch them, and then he fastened a fly to a stick and put it over the water. As soon as the fish saw the fly he came steadily towards it till he was within a short distance of it. Then he lifted his head a little from the water and sent a stream flying right up to the insect and hit it, but did not bring it down because it was fastened. The fish seemed much surprised that the fly did not fall, but he swam around the vessel and came up to it again and tried once more. Soon the other fish in the vessel saw it and came up to it in the same way and tried to sweep it down with a stream of water. And finally there was a stream of fish swimming around the vessel and stopping just long enough to take a shot at the fly.

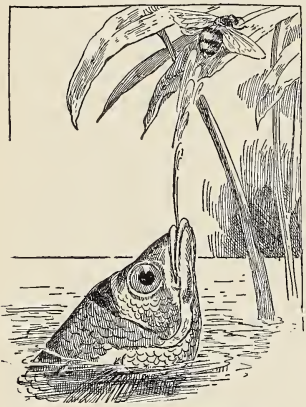


FIG. 48. — The Archer-Fish Shooting a Fly.

But if the fish had to wait till they could bring down flies in this way before getting their dinner, I am afraid most of them would go hungry and many starve to death. But they do not have to trust to this food alone. They find the water itself full of food. You see in the picture (Fig. 49) one of them — a very big fish four or five feet long with a very big mouth — trying to catch one of the little fish and eat it. The big fish is called the Angler-fish, because he has that curious sort of a fish-pole and fish-line sticking out from his head. He covers himself up in the mud or sand, leaving only the fishing tackle reaching out into the water. Then he waves it back and forth so that the little tag at the end looks like some little living thing, and when a small fish comes prying about and tries to taste it, the big fish feels it and suddenly opens his mouth and swallows the poor little fish.

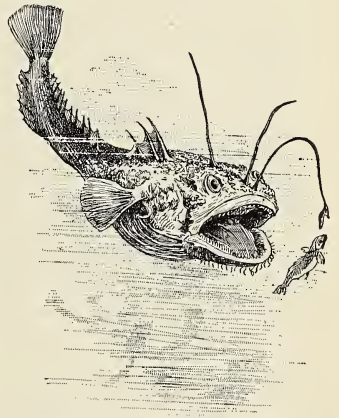


Fig. 49. — The Angler-Fish Angling.

There are a great many other big fish who eat the little fish. Indeed, it seems as if that was what so many little fish were born for, since the whole ocean would be packed solid with fish in a very short time if all the little ones lived and grew up, just as the whole earth would be filled full of plants in a little while if all the seeds grew into plants.

You see in the next picture (Fig. 50) how the spider gets her share of the insects that seem to feed so many of her fellow

creatures. She has no wings or fins, so that she cannot fly or swim, nor has she a long tongue like the toad to catch her food with. How does she manage to get it? She does just as men do who wish to catch the fish in the sea. The fishermen take cords and tie them by knots into a large net and hang it between stakes in the water, so that the fish, as they swim along, will get caught in it and furnish food for us.

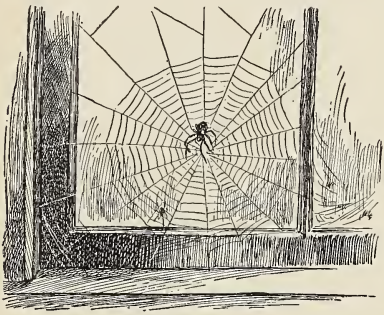


Fig. 50. — A Spider's Net.

So the spider spins cords and makes a net and sets it to catch the flies for food. You have seen many of those nets, like the one in the picture, but perhaps you never saw the spider making it. She usually picks out some place where she can have a post or tree or doorway to fasten one side of it to. She cannot drive posts in the ground as men do in the water to hold their nets, so she has to take what she can find. When she has found the best place, like the corner of a window frame, she fastens a line to one side of the frame and then goes down to the window sill and up the other side of the frame and pulls the line up tight. Then she goes across on it till she reaches the place where she wishes the centre of her net to be. Here she fastens one new line after another, just like the spokes of a wheel, and joins these spokes by some cross lines like the tire of a wheel. These cross lines are very sticky and stretch like a rubber band, so that when a fly comes sailing along and

strikes one of the webs he is caught fast. And the more he struggles to get away, the faster he sticks.

The spider sits in a little nest in the corner of the window frame or some other safe place, holding fast to a cord stretched from the centre of her net. And the moment she feels the fly struggle she rushes down to the centre, as you see her in the picture, and seizes the lines of the web and pulls, something as a fisherman does when he has a bite. She can tell by the feel-

Fig. 51. — Monkeys Trying to Dine.

ing which of the lines the fly is on, and she runs right down to him; and if he is a large one, she spins some more cord and winds it about him so that he shall not get away. When she has him caught fast she carries him up to her nest for dinner, and then fixes her net up to catch another for supper. So you see she has to work just as hard as any of the others to get her daily bread.

And here are some monkeys getting their dinner (Fig. 51). They are the brothers of the little monkeys you see on the hand-organs. They live in Africa, and one day they went out in the forest to get something to eat. They saw some birds'

nests on a tree, and as they liked eggs very much, they thought they would get a few to eat. But the nests hung on slender branches out over the water, and as soon as the monkeys tried to climb out to one of them, the birds all came flying at them and struck them with their sharp bills till they tumbled one of the monkeys into the river. You can see his head just above the water, and the other one looks as if he would get a ducking, too. I suppose the monkeys thought that birds' eggs were meant for them to eat, but the birds themselves did not seem to think so. What do you think about it? Were hens' eggs meant for us to eat? And how do we manage to get them for our breakfasts? Why don't the monkeys keep birds and feed and shelter them, and so have all the eggs they want?

He that feeds men, serveth few;
He serves all who dares be true.

EMERSON.

TEACHING NOTE.

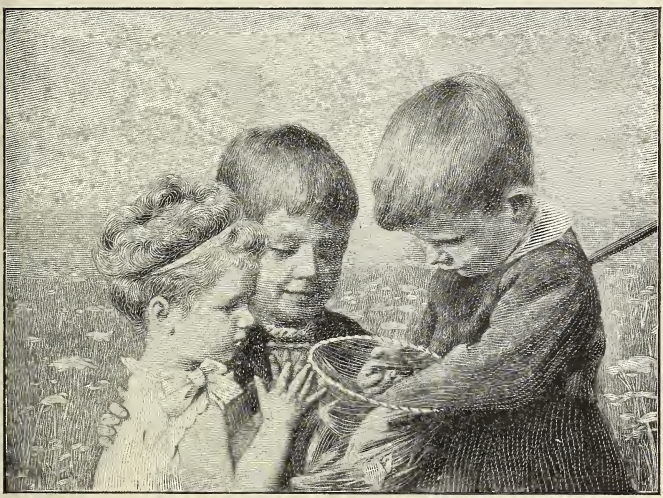
The repetition of the incidents of these chapters will be of interest and profit, and will show to what degree the main purpose, as stated in the preface, is being accomplished.

Pupils can be led to distinguish between work which, as has been shown, belongs to animals no less than to ourselves, the spirit of, and toil in which no such healthful principle is present.

CHAPTER X.

HOW MOTHER NATURE SETS THE TABLE FOR THE INSECTS.

How interested they are in that gauze net! They have just caught a butterfly in it, and now they are going to hold her in their hands and have a look at her graceful wings and beautiful



colors. But how frightened the poor little butterfly must feel to find herself caught in such a trap as that! And how rough the boy's hands must seem to the tender creature! You can imagine how you would feel if some great giant should sud-

denly scoop you up in a net as big as a room. I think you would struggle to get away as the poor butterfly does. And what do you suppose she was doing when the little boy saw her hovering about a flower and flung his net over her? She was just going to dinner. For the flowers are the dinner tables for the butterflies. They do not eat the pretty petals, but they sip the honey that is found in the petals of the flower. You have often sucked the honey in the petals of the clover or in the tips of the red columbine, I am sure, and you know how nice it tastes. Almost all of the flowers have just such sweet syrup as that down deep in the petals, and it seems just as if this sweet juice was meant to be the food of insects like the butterflies.

The flowers are like so many dishes of honey set all over the earth to feed the insects, and I dare say that the insects think that the whole earth is one great table with the blossoms for plates. So they go flitting about from one plate to another, helping themselves to the sweet food set out for them. If you want to see how beautiful the colors of the butterflies are, and how daintily they sip their food, and how gracefully they fan their wings, the best way is not to catch them in a net, but to stand quietly beside a bed of flowers in summer and watch them as they come and go. Or you might find some chrysalids hanging on trees or walls and put them in a box with a glass top, and in the spring each chrysalid would wake up, some of them into moths and some into butterflies, and you could see them stretch their new wings. And if you put a flower into the box you could see the little creatures sip the honey from down deep in the petals.

How do you suppose the butterfly gets at the honey? She does not pull out the petals to suck it, as you or I would do, nor does she tip the flower to turn it out, for it would not run

out if she did; nor does she creep down into the flower. But she sucks it out through a sort of long tongue that she has, which you see coiled up under the head of the butterfly in the picture (Fig. 53). When she comes to a flower she straightens this tongue out and pushes it down into the bottom of each petal and sucks up the sweet liquid, just as you can suck up water through a dandelion stem or a straw. I remember in my boyhood that the first time I saw a cider-mill the cider was running into a great tub, so big that we boys could not tip it to get the cider. Nor were there any dippers to dip it up. But the mill was in a barn and there were plenty of straws stacked up in the mow, and we were soon sitting around the tub, each with a straw in his mouth, sucking up the sweet cider. That is the way the butterfly sucks up her sweet food, only her straw grows out of her mouth, and she can roll it up out of sight as soon as she has finished one flower and wishes to go to another.

Fig. 53. — Head of the Butterfly.

In the picture of the moth you see the long tongue uncoiled (Fig. 54). The moth is just going to push it into the flower. It does not need to be so long for just that blossom, but some of the

Fig. 54. — The Sphinx Moth.

blossoms have very deep cups, like the morning-glory, or long spurs, like the honeysuckle, so that the honey would be quite out of the reach of an insect with a short tongue. You do not see the moths so often as you do the butterflies, because they nearly all fly only by night. But if you look under a street lamp in the morning, you will almost always find some that have killed themselves by flying against it the night before, and you can see their beautiful colors and can uncoil their long tongues by using the point of a pin. But the best way to see them is to find some of their cocoons and put them in a glass-covered box and then watch them open. Sometimes you can see them eat by putting a dish of sweetened water in the box, but most of them like flowers better and will feed on them only at night. There are some moths, however, which cannot eat at all. One of them is the great polyphemus moth, which has on its wings beautiful spots like the eyes of peacock feathers. The first time I tried to feed a moth, it happened to be one of these, — a Mrs. Polyphemus who had flown into my room, — and I was much troubled because she would not eat, though she laid a hundred eggs or more in the box where I put her. But I found out afterwards that she never eats after

Fig. 55. — Brazilian Bees at Dinner.

she has become a moth. She finishes her dinner while she is a caterpillar eating leaves.

The bees also, as well as the butterflies and moths, get their food from the flowers; and they, too, have long tongues to suck up the sweet juice, as you see from the picture of the Brazilian bees at dinner (Fig. 55). With such tongues they can reach down very deep in the flowers. Our own hive-bees, which you see in the picture (Fig. 56), do not have their tongues quite so long and so they have to push their heads into the flower. When you stand beside the flower-bed in summer to watch for butterflies you will see a dozen bees to one butterfly, and the bees will all seem to be in a greater hurry than the butterflies.

FIG. 56. — Hive-Bees at Dinner.

This is not because they are so much more hungry than the butterflies, but because they have baby sisters at home to feed, while the butterfly has no one but herself to tend. The bees carry their honey to the hive and give it to the nurses, who mix it with bee-bread and give it to the tiny baby bees, something as the ant nurses give food to the baby ants. There are hundreds of those baby bees in every hive, and they are all hungry and need to be fed often. So their sisters who get food from the flowers for them must wake up early and work

hard all day long, as hard as your father and mother do to get food for the children at home.

But insects can suck their food out of the green stalk of a plant as well as out of the flower. You must have seen on the plants in flower-pots little green aphides, or plant-lice, as they are called. You can see a lot of them clustered on the stalks in the picture (Fig. 57). They are pictured four or five times larger than they really are, so that you can see them better. Each one has a sharp little bill, as you see in the lower one, and it will go through the tender bark of the young shoot, as a mosquito's bill goes through our skin. So they can suck the sap out of the petals. And each one of them has two little tubes sticking out of the back of its body, as you can see in the cut, and out of those tubes they can send tiny drops of honey.

Fig. 57. — Ant and Aphides at Dinner.

But the ants have found out that these little creatures give honey; and so you can almost always find some ants running about among these aphides when they are on plants out of doors. If you watch them carefully, you will see the ant touch the tubes with its feelers, as in the picture, and then a tiny drop will come out of the tubes and the ant will eat it, for ants are very fond of sweet things. Men who have studied ants call

these aphides the cows of the ants, because they get honey from them as we get milk from our cows. The wasps like honey also and try to get it from the aphides. When I was a boy I once found a tree where a whole line of ants were going up and down the trunk. When I looked closely at the branches and leaves of the tree I found some aphides feeding there and furnishing this sweet milk to the ants. While I was watching them a big wasp came flying along and alighted near some of the aphides. But she had hardly touched the leaf before three or four ants came running towards her. She seemed to see them, for before they were near enough to touch her she started up and flew off in a way that made me think she was really afraid of the tiny creatures.

But some of the ants have hit on a better way of keeping the wasps from their cows. They build little sheds out of clay or crumbled wood to cover them up, something as men build barns to cover up our real cows. Sometimes the ants even make a covered passageway leading from the aphides down to the ground where their home is. For of course they carry this honey down to the baby ants in the ant-hill. But they have still another way of getting honey for their nurslings. They make tunnels in the ground where the roots of plants grow, and take some aphides like these and put them on the roots and let them suck the juice and make their honey there where the wasps cannot get at them and where their little ones can be fed still better. When winter comes and everything is frozen, the aphides die, but they leave eggs that will hatch out into new aphides the next spring. The wise little ants gather up the eggs and carry them into their own homes and tend them carefully during the long, cold winter. But as soon as spring comes and the ground thaws so that the sap is run-

ning in the roots once more, the ants dig their little tunnels along the roots again. Then as fast as the young aphides come out of their eggs, the ants carry them out to the roots and set them to feeding there, just as the farmers drive their cows out to the pasture in the spring to feed on the new grass. The ants seem to think that the aphides were meant to furnish honey for them and their babies. I wonder what the aphides think about it. What do you think about it? Were the cows meant to furnish us with milk, and the bees to furnish us with honey?

Nature ever faithful is
To such as trust her faithfulness.

EMERSON.

TEACHING NOTES.

Mrs. Bullard's *Butterflies and Moths* will be useful, especially in telling how the perfect insect can be obtained from the cocoon.

Miss Buckley's *Fairy Land of Science* has a chapter on bees and flowers; also Mr. Scudder's *Butterflies: Their Structure* and his *Life of a Butterfly* will be helpful.

A plant with living aphides will not be difficult to obtain; nor should a mounted butterfly or moth and a flower with a long calyx. If the teacher is well prepared to answer questions, and pupils are encouraged to ask them, the exercise following the reading may be made very profitable.

CHAPTER XI.

HOW MOTHER NATURE SETS THE TABLE FOR THE PLANTS.

"THE FAVORED ONE" is what the painter of this picture calls it. I suppose that he means that the little girl in the centre is "the favored one," because she alone is drinking some of the milk, though the two cats evidently want a drink

of it. You can see one of them looking so eagerly and longingly at the milk, and the other is coaxing for it by rubbing her head against the feet of the milkmaid. There are the two calves, too, that seem to be wondering why they have to wear sharp points of cruel iron on their noses to keep them from getting any of their own mother's milk, while the little girl can

have all she wants. And the kind old cow-mother herself looks a little troubled over it.

But I think you know why we let the little girl drink first. If we let the cats always get all they wanted first, there would not be anything left for the boys and girls, and boys and girls are much more help to the world than cats are. And if we let the calves get all the milk they wanted there would not be any left for us. So we have to keep the calves away from their mother and give only a part of her milk to them. In that way we get enough for them and us both, and enough to make butter also.

Fig. 59. — Milking the Cow Tree.

But where does the cow herself get the milk she gives to us? She stays all day in the pasture, which you see in the picture, and eats nothing but grass, and drinks nothing but water. Yet she has a whole pailful of milk at night and almost as much more again in the morning. So you see the milk must somehow come from the water and the grass. Neither the water nor the grass seems to have any milk in it, yet the stuff out of which the milk is made is really there in the water, and the juice of the blades, and stems of the grass. You remember

that the corn-mother made "milk" for her baby seeds, and we saw the milk "condensed" in the kernels of corn. The white flour also that we eat in our bread is the condensed milk which the wheat-mother made for her baby wheat seeds. There is a tree in South America called the cow tree, because when you cut into it a stream of white juice runs out that looks like milk and tastes like it, and has in it about the same stuff milk has. You can see some people cutting or tapping such a tree in the picture (Fig. 59).

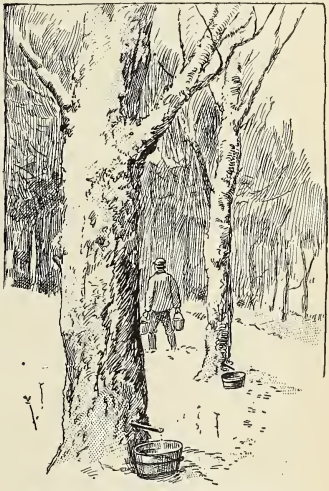


Fig. 60. — Milking the Maple Tree.

Perhaps some of you have seen people tapping trees here in our own country. When I was a boy in New England I used to enjoy going in the spring to a sugar berth, as it was called. It was a grove of maple trees which had been tapped by boring holes in the trunks of the trees and putting round tubes into the holes. A sweet sap would run out of the hole and drop into the pail set under the tube, as you see it doing in the picture (Fig. 60), and out of that sap maple syrup and maple sugar were made. So you see the farmers milk their maple trees as well as their cows, and they get a good many pailfuls of maple milk, as it were, from each tree.

But where do the maple trees get the sap, and the cow trees the milk, they pour forth so kindly to us? And where does

the grass get the juice it gives the cows that they may change it into milk? Where is their table set to furnish them with food? If you should pull up a bunch of grass, you would find a lot of fine, white, thread-like roots running down into the ground. So, too, if you could pull up a maple tree, or any other tree, you would find that the big roots send out at their sides or tips these same fine, thread-like shoots. Of course you cannot pull up a big maple tree, but you can pull up a baby maple, like that in the picture (Fig. 61), and you will find its own roots covered with those little white hairs. If you look at the tip of the root with a magnifying glass, it will appear like that thing at the right of the baby maple ; or if you could magnify it still more and see it with all the bits of earth about it, just as it is in the ground before you pulled it up, it would look as you see it in the next picture (Fig. 62). You can see there that the hairs are little tongues pushed out into the earth between the bits of sand to suck up food, something as the long tongues of butterflies and moths are pushed into the flowers to suck up the sweet juices the plants make. The plants do not eat the earth, any more than the moths and butterflies eat the flowers. The roots only send out their long, slender tongues and lick up all the juices they can find in the earth.

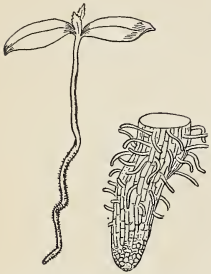


FIG. 61. — A Baby Maple (the tip magnified).

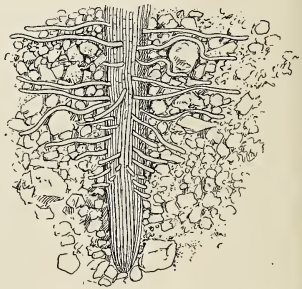


FIG. 62. — Tip of Root Magnified More.

How do you suppose these slender rootlets manage to find their way about in the dark earth, so as to get their food and steer clear of the obstacles in their pathway? You can see from the picture of the root in the earth (Fig. 62) that one of the little tongues has bent right around a bit of gravel and then gone straight on its way again. Men used to think that the stone pushed the root away. But if that were so, it would go growing off in another direction, instead of climbing over the stone and keeping on the same way, as you see it does. And Mr. Darwin proved by a very pretty experiment that it was the root that moved itself because it was trying to get around the stone, and not because it was pushed away by the stone; for he got the roots to turn by making them think there was a stone in their path when there was really no obstacle at all in their way. You can see his experiment in the picture of the roots trying to dodge an imaginary stone (Fig. 63). He thought that if the roots turned of their own accord because they felt the stone, as we turn to avoid a wall when we feel our way along in the dark, then they would turn without any stone in their way if they felt something that seemed like a stone. So he started some seeds, and when the roots began to grow he pasted a tiny bit of paper on the side of each root tip. Of course the paper was not able to stop the roots. They could have gone on growing straight ahead if they had only thought

Fig. 63. — Baby Roots Dodging Imaginary Stones.

so. But the little things were fooled and thought the touch of the paper was the touch of a stone in their path, and so began to try to get around it. But the paper was stuck to them, and as they turned they took it with them. So they kept on turning and turning, some of them three or four times round, till they knocked the bit of paper off, as you see the two lower ones have done ; and then they started straight on again, thinking they had at last got around that big stone they imagined in their way.

They remind me of a cat I had in my boyhood who brought a mouse into my chamber once and let it loose to show me how well she could catch it. But the mouse ran into one of my congress boots that was lying on the floor, and the cat pushed her head in after it. But when she tried to pull her head out, the elastic held the shoe fast on her head. So she began to try to back out of it, and she backed all the way around the room two or three times, till I came to her help and pulled the boot off. I suppose she thought she could back out of the shoe if she backed far enough. But she could not, because she was taking the shoe with her on her head. And so the roots thought they could turn away from the obstacle if they turned long enough, but they could n't, because they were carrying the obstacle with them.

The roots also know how to find the best food and water, as well as how to avoid obstacles. I have heard of a root that climbed a wall six feet high to get at some water the other side of it, and of another tree that sent roots sixty feet away in one direction because there was a spring of water there, though the roots went only a few feet in the other direction. You know how thickly trees grow beside a stream. They seem to gather about the water as the bees and butterflies gather about

the flowers. And they gather for the same reason, because they find a table set for them there. The roots of the little plants, like the wheat and the barley, will push their tiny fingers down into the ground five or six feet in trying to find water. But up in Siberia, where the ground is frozen within two or three feet of the surface even in summer, the roots will not try to go down straight. When they get near the frozen soil they will turn their shoots off level with the surface. But when a plant starts high up on the branch of a tree, it will sometimes send its roots straight down forty or fifty feet, as if feeling for the ground. It seems to think its table is set for it somewhere, and it keeps on groping till it finds it.

So you see the great earth itself is the table set for the plants, just as the plants are the table for the cattle and the insects. Mother Nature has spent thousands of years getting this table of the earth ready for her plant children. She has crumbled the rocks by freezing and thawing them, and by wetting and drying them, till they make a soft bed for the baby plants to sleep in during the winter and a rich table of food in summer. All that the little baby seed has to do when it has waked up in the spring and eaten the condensed milk its mother made and laid up for it is to stick out its tiny tongues and it will find plenty of food melted in the moisture of the earth. Somebody seems to have made this whole globe a great round ball of condensed milk which the rains melt, so that all the tiny mouths of the millions of plants can suck it in and change it to sap or milk, or corn or wheat. But all these plants have to work hard to get this food. They have to push their tender tongues out in all directions, and climb over stones and walls to reach the food. Mother Nature does not pour it down their throats, any more than she pours honey down the

throats of bees or butterflies. Those that wake up earliest and work hardest get the most food and outgrow and overshadow the others. Mother Nature sets her table over the whole earth for all her children, but she does not allow any of them to eat without earning their food by working for her. The plants that feed the cattle, the cattle that eat the grass and change it to milk for us are all working. The birds and insects that cradle and tend their little ones are working for her. But the man or woman, or boy or girl, that does some kind act, or speaks some loving word, is doing the noblest work of all, and so is fed with the bread of earth and heaven most bounteously.

> Rocked on her breast, these pines and I
> Alike on Nature's love rely.
>
> WHITTIER.

TEACHING NOTES.

Besides the books on plants previously mentioned, Darwin's *Power of Movement in Plants* and Gray's *How Plants Behave* will be helpful. Taylor's *Sagacity and Morality of Plants* will also give suggestions for the whole series. The best recent book on the subject is Kerner von Marilaun's *Natural History of Plants*, translated by Oliver and just published in England in four half-volumes.

This chapter can be made more real to the children by showing them some seeds that have just started, or still better by asking them to start the seeds for themselves.

CHAPTER XII.

HOW MOTHER NATURE CLOTHES THE BIRDS.

You can all see what that little girl is doing in the picture. She is playing with one of those dear little kittens, while the other one is eating milk out of the saucer on the ground. But can you see what the mother is doing? It looks as if she were sewing, does n't it? If you look at the picture closely, I think you will see what it is she is sewing. It is a little jacket. So I suppose she has a little boy somewhere, — perhaps at school, — and she is making him a coat, or mending it for him. That sweet little girl has on a dress that her mother has probably made for her. If you look through the open door

at the right of the picture, you will see a tiny baby sleeping in a cradle, and I am sure that the baby's dresses were also made by her mother, who loves her too dearly to let any one else do it for her.

So you see what a busy woman this mother must be, making and mending the clothes for all the little ones, and perhaps as many more bigger ones that we know nothing about. I should n't wonder if she had to sit up at night after the children were abed and asleep to keep them warmly and neatly clothed. But what would she do if she had to make and mend the clothes of all the people in the world, big and little? And what would she do if, besides that, she had to make and mend all the clothing for all the birds and all the cattle and all the fish and all the insects and all the plants? Do you suppose she could manage to do all that? I don't believe she could, even if she sat up all night long every night in the year. And yet somebody is making and mending the clothes for all these countless crowds of creatures all the time, and giving them new suits of clothes every year, and sometimes two or three times a year. Who do you suppose this good mother is? And how do you

Fig. 65. — The Ptarmigan in his Summer Suit.

suppose she manages to clothe her family? Let us see how she does with the birds.

If you should feel a live bird's body, you would find that it felt a great deal warmer than your hand or your face. And it is really warmer than any other living thing. You know it goes flying through the air, so that a cool breeze is blowing upon it all the time. Therefore it needs very warm clothing to prevent it from getting cold. It has just the clothing it needs in its feathers. You know how warm feathers are, and you can see from the picture of the Ptarmigan in his summer suit (Fig. 65) that he seems covered all over with dark-colored feathers. In winter he has a still thicker coat of white feathers to match the white snow, as you will see from the next picture of the same bird in his winter suit (Fig. 66). How does he get his clothes? How does he change them with the changing seasons of the year?

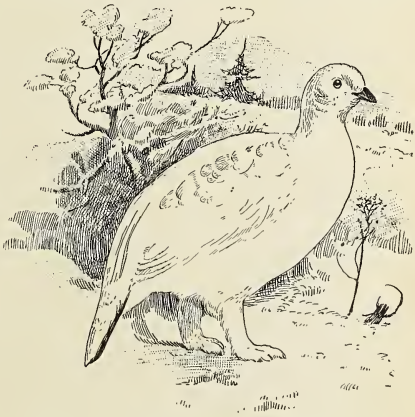


Fig. 66. — The Ptarmigan in his Winter Suit.

Next spring, when the mother hen has her tiny chickens, if you will look at them closely when they are only a day or two old, you will find that they do not seem to have feathers like their mother, but are covered over with soft down, more like

hair than feathers. That soft down is their baby clothes, and they get it before they leave their shells, so that they are born with their baby clothes on. It grows out of their skin, just as our finger nails grow out of our skin at the end of the fingers.

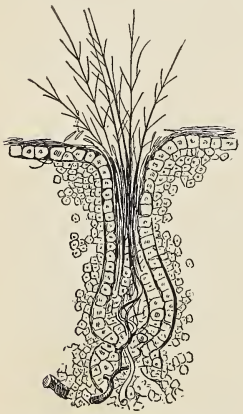


Fig. 67. — A Feather Growing.

In the picture of the feather growing (Fig. 67) you see it coming through the cells of the skin something as the blades of grass come up through the grains of sand. The soft downy points that are to form the sides of the feather come up first, as you see in the picture, and the feathers come out later. In the next picture of the wing of the bird (Fig. 68) you can see the feathers full-grown. You will notice how far the quills go down into the skin, something as the stalks of some plants go down into the earth. And when a bird like the ptarmigan changes its summer clothes for a thicker winter suit, the new feather grows up right in the same place where the old ones are and pushes them out, so that they fall off and you find them on the ground sometimes. That change of dress is what is called "molting," and it takes place so rapidly that in a few weeks a bird will change all its feathers and have a new suit, though the old feathers do not all come out at once, because the poor bird would be likely to freeze to death if they did.

So you see how the birds get their clothing. The bird mothers do not have to sit up nights making and mending the clothes of their little ones, because the clothing grows out of

the skin of the birds, as the plants grow out of the earth. But the plants grow from seeds in the ground; and who do you suppose sowed the seeds for the feathers, and waked them up and taught them how to grow? Whoever it is that does it must be very, very busy, for you know what countless numbers of birds there are, all having new suits of clothes every year to take the place of the old suits that get worn and torn.

But though the birds have their clothing grow for them, yet they have to take care of it for themselves. If you have ever watched canary birds, you must have noticed how often they have to fix their feathers — "preen" them, as it is called — by smoothing them out with the bill. Birds have to comb their feathers more carefully than you do your hair. For, if you let your hair go, so that it got snarled, I suppose you would not die, though you would not feel so comfortable, nor look as well as you do now. But if a bird should let his feathers become tangled and wet and dirty, he would probably die in a very short time, because his clothes would not keep him warm any longer. For the feathers are warm because they are not packed close together but are loose and have places filled with air between them. By raising the feathers and making those places larger the feathers become still warmer. If you notice a canary bird when he is asleep, you will see that his body seems much larger than when he is awake. That is because

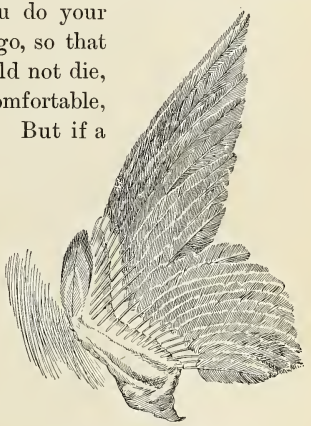


Fig. 68. — A Bird's Wing.

he lifts up his feathers and so makes them warmer when he goes to bed, as we put on more clothes at night. And he tucks his head under the bedclothes, too. In winter you will notice that the sparrows seem puffed out larger. They have really put on their thicker coats by raising their feathers. But the birds could not do this unless they kept their feathers clean. So they have to be always washing them and brushing them and laying them down straight, because they cannot take them off and wash them and iron them once a week.

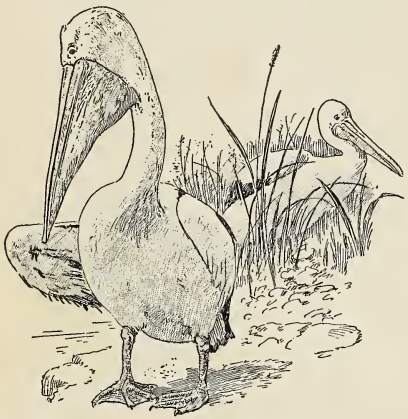


FIG. 69. — Pelican Fixing his Clothes.

When a bird goes into the water, as so many birds do, he has to be still more careful of his clothes or he will get them wet through and so die of cold. All water-birds have an oil-can, or oil-gland, as it is called, located down among the tail feathers. When the bird has smoothed out his feathers, he reaches his head down to the oil-gland and gets a nip of oil in his bill and oils the feathers, so that the water will have hard work to get into them. It makes a sort of oilcloth of the feathers, so that the water runs off a duck's back instead of soaking in and wetting the duck. In the picture of the pelicans (Fig. 69) you see one of them oiling his feathers with his bill. He has been

fishing for his dinner and had to dive into the water to catch the fish, but as soon as he has come out on the shore he begins to work on his feathers. It takes him about all the time to get his meals and fix his feathers.

The baby birds cannot manage their feathers so well as their mother can, and so the mother sometimes carries the little ones on her back when they get tired and wet, as you see the crested Grebe doing in the picture (Fig. 70). The land birds, like our domestic fowls, have so little oil on their feathers that they would get wet through very quickly. The little chickens sometimes die when they are out in a cold rain, and even the grown up hens do not like to go into the water. I remember reading once of a swan that carried a hen on her back, as the grebe carries her little ones. The swan and the hen had each hatched out some little ducklings at the same time, and the two broods used to go around together, the hen scratching for them on land and the swan looking after them when they took to the water. But the hen seemed very much troubled when the

Fig. 70. — The Crested Grebe Keeping her Babies' Feathers Dry.

ducklings were on the water where she could not look after them. So one day the swan came swimming up to the shore and took the hen upon her back and carried her out among the little brood, so that she could watch over them without wetting her feathers.

This scrap of valor just for play
Fronts the north-wind in waistcoat gray.

EMERSON, *The Titmouse.*

TEACHING NOTE.

A number of excellent books for children, on the habits of birds and the provisions in nature for their happiness, have been lately published. The reading of *this* book should be made the occasion for commending others for outside reading if school time cannot be afforded. The deeper purpose of this book makes it a good foundation for getting the best value of others later on.

CHAPTER XIII.

HOW MOTHER NATURE CLOTHES THE MAMMALS.

WHY do you suppose the shepherdess is carrying that lamb in her arms? Perhaps the poor little thing was cold and so numb that it could not walk. The baby lambs are born so early in the spring, sometimes, that they have to be wrapped up in a blanket to keep them warm, because their baby clothes are not so thick as their mothers' clothes, as you can see from the picture. Where do you think they get such nice warm clothing? Who do you imagine makes it for them? It is made by the same good mother that makes the birds' clothing. You remember that the birds' clothes, instead of being cut out of cloth and sewed together,

and put onto the birds from the outside, were made to grow out of the birds' skin in the shape of feathers, something as our nails grow out of the ends of our fingers. The sheep's clothing grows in the same way out of the skin of the sheep, just as hair grows out of your head. Each hair of your head has little oil-glands to keep it moist, so that the water cannot easily soak in to wet your head. In just the same way each hair of the sheep's wool has oil-glands to make a sort of oil-cloth of the fleece so that the rain may run off without wetting the sheep or the lamb. So they do not have to oil each separate hair, as the bird does each feather.

The sheep, too, have thicker clothes for winter, and thinner for summer, just as well as the birds do; for the wool of the sheep falls off every spring, or would fall off if it were not cut off by the shepherds. Then a new growth starts, and by winter it is long enough to keep them warm. And then in the spring it falls off again. So it does every year, giving them a thick coat in the winter and a thin one in the summer. The wild sheep of the Rocky Mountains, who do not have any one to shear them, have an overcoat of long hair grow in the fall and drop off in the spring, while their undercoat of short hair stays in the summer as well as in the winter. If you will smooth your kitty's back the wrong way, you will see the same two coats she has on, one of longer, coarser hairs, and the other of finer, shorter hairs. You must have often seen her cleaning her fur by licking it with her tongue. She has to work very hard to keep it clean, because it has not so much oil as the sheep's wool has, and would easily get wet and dirty, and so be cold and unhealthy. And when the cat has little kittens you will see her clean them in the same careful way before they are large enough to take care of themselves. She has to do all the family washing

for herself and all her children, and has to do it with her tongue, and yet she keeps herself and her family very clean indeed.

In the next picture (Fig. 72) you see another mother and her family, the white bear mother and her two babies. They are lying down deep under the snow. On the surface of the snow you can see the dogs and men hunting for the bear, but they will hardly find her, because she is buried so deep in the snow. You remember how she lies down under some cliff and lets the snow fall on her, and cover her and her babies up till they are wholly out of sight. But she would freeze to death if she did not have such long, thick fur to keep her warm. That is her blanket and quilt, and she draws her little ones up to her breast so that they do not feel the cold and the snow, though they, too, have their baby clothes of fur when they are born.

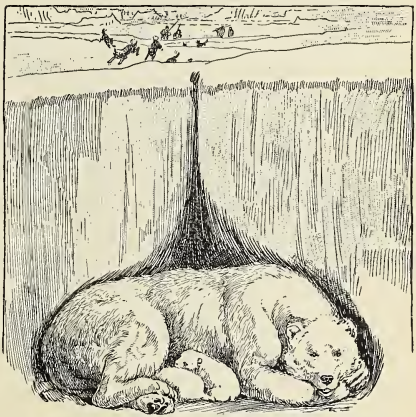


Fig. 72. — The White Bear in her Winter Clothes.

One of Mother Nature's largest children is the elephant. I think you must have seen an elephant, and I dare say you think it would take a pretty large suit of clothes to cover him. He looks as if he had nothing on his skin to keep him warm, and he lives in a country so hot that he does not need any clothes. But his ancestors — his great-great-grandfathers —

used to live on the earth during what is called the Great Ice Age, when most of the land where we live was covered with vast fields of ice, ever so thick. These animals were called mammoths, and though they were much larger than the elephant is now, they had clothing to cover them; for a coat of brown hair nearly a foot long grew all over their bodies, and they had a shaggy mane about the head and neck. You can see one of them in the picture of the mammoth (Fig. 73), and you can make out the great glaciers or ice-fields in the back of the picture, while in the right-hand part of it there are three seals that also wear fur clothes — sealskin coats — which not only keep them warm, but also keep them dry when they swim in the water, as they do a great deal of the time. So you see the great mother kept her children well clothed even in the ice age. But when the ice-fields melted away and it grew hot again, she took off their heavy coats, so that you will find only a few coarse hairs on the elephants of to-day.

Fig. 73. — The Mammoth in Winter Clothes.

The mother monkey in the next picture (Fig. 74) does not have to make her baby any clothes, for they grow on him just as her clothes grow on her, though I think she would find

some way to keep him warm even if he was not born with clothes on. She carries him in her arms when he is small, and she keeps the flies away from him when he is asleep. And when he wakes she takes him down to some pool of water and washes his face like a human mother, and if he does not behave himself she boxes his ears, I am sorry to say. You see from the picture that she uses her long tail to hold on to the branch of a tree, but she also uses it as a sort of comforter to wrap around her neck, or her baby's neck, when it is cold, as it often is at night in South America, where these monkeys live.

Besides keeping her children warm, Mother Nature keeps them safe by their clothing when they seem to need it. The soft hairs grow stiff and sharp, as the hairs on the back of a pig. Those pigs' hairs we call bristles. You can see them in any tooth-brush, and you can feel of them and see how strong and sharp they are. But on the porcupine, as you see in the picture on the following page (Fig. 75), they grow still longer and sharper and stiffer, so that they are like so many sharp needles ready to stick into any one. The porcupine is a slow, weak creature, and she cannot keep herself safe by running, or biting, or scratching. So when she finds any one coming

Fig. 74. — The Woolly Monkey and her Child.

she gets right in front of her little ones, and turns her bristling back toward the enemy, and then she raises her quills so that they stick out in all directions. If you touch them, they seem to fly right out of her skin into your hand. And they work their way deep into your flesh, so that sometimes lions and tigers have been found dead with some of these quills sticking into them far enough to kill them. But if you do not try to touch her, she will smooth them down and let her little ones come out from behind her and begin to eat, as you see them doing in the picture (Fig. 75). The little ones themselves have only soft white quills when they are born, but as they grow older the quills grow hard and long, so that in a few weeks the little ones can look out for themselves in the same way that their mother does.

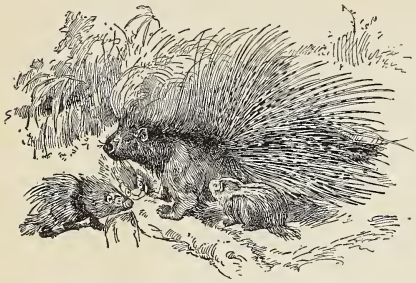


FIG. 75. — The Porcupine Mother and her Children.

FIG. 76. — The Six-Banded Armadillo.

A still stranger suit of clothes is seen in the next picture (Fig. 76). The Six-banded Armadillo, as it is called, has

some hair under its body and a few hairs between the scales on its back. But on most of its surface you see it has bony scales, covered over with a sort of enamel, something as if we had a lot of finger nails growing out all over the back of our body. The bony scales grow out of the skin as the feathers and hairs do. But this creature does n't need hairs to keep him warm, though he does need scales to keep other creatures from eating him up. So his suit of clothes grows out of his skin, as a suit of armor. He uses it to make himself safe in several ways. If you come upon him, he will at once burrow into the ground with his strong claws, as you see him doing in the picture. In three minutes he will dig a hole deep enough to squeeze into it and get out of sight. If you try to pull him out by the tail, you will find that you cannot possibly do it, because he raises his scales, something as the porcupine does his quills, and sticks their sharp ends right into the earth above his back, while his long, sharp claws stick into the earth below him. You may pull his tail off if you pull hard enough, but you cannot move him. Another way he uses the scales to defend himself is by rolling himself up into a ball so that the outside of his body is almost covered with scales.

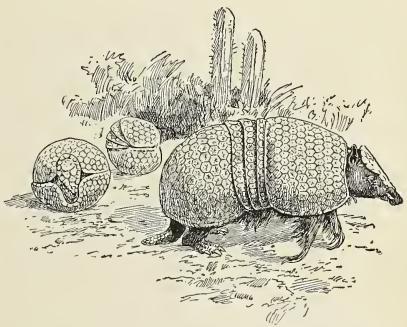


FIG. 77. — The Three-Banded Armadillos.

But his cousin, the Three-banded Armadillo that you see in

the picture on the preceding page (Fig. 77), is still better clothed for turning himself into a round ball. You see that the scales on his shoulders have grown into one solid bony box, like half of the cocoanut shell, and the two halves are joined in the middle of his body by bony rings that open and shut, something as the sticks of a fan do. When this armadillo goes out walking, he opens his two half boxes, as you see him in the picture, and walks slowly along on the tips of his toes. But whenever you come upon him he does not try to dig into the ground as his cousin does, but he shuts up his two half-round boxes into one box wholly round, like a cocoanut shell before you cut it open. You see two of these armadillos shut up that way at the back of the picture on the left-hand side, and you can see in one of them how the scales on the head and tail close up the opening altogether, so that even the dogs cannot get at the creature, though they try hard to bite into it. So you see how safely as well as warmly these children of Mother Nature are clothed.

> Know, Nature's children all divide her care;
> The fur that warms a monarch warmed a bear.
>
> POPE.

TEACHING NOTES.

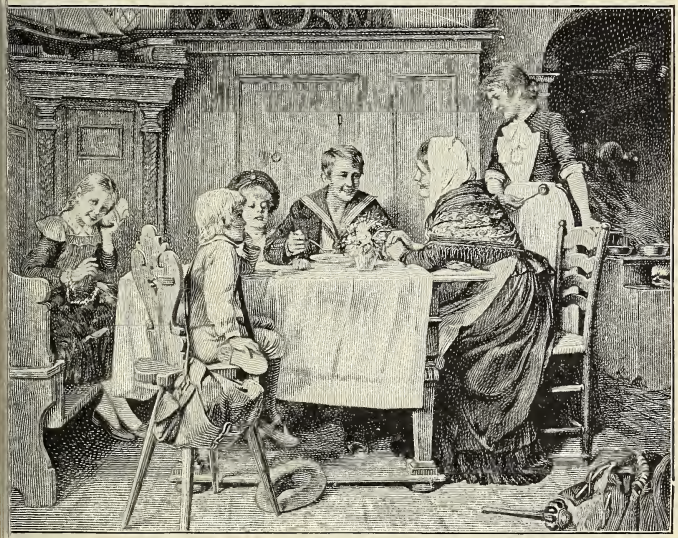
So good an opportunity should not be neglected to bring to class notice scientific facts belonging to the need and value of a higher standard of cleanliness and sanitation than is held in most communities.

Our purpose is to teach only the facts of nature as they can be observed. The children will doubtless get ideas that are too narrow and positive, but they will insensibly enlarge them as they learn more of the world and human life.

CHAPTER XIV.

HOW MOTHER NATURE CLOTHES THE MOLLUSKS.

HERE is a happy family. The oldest boy has been away to sea and has just come back from his first voyage, and he is so



busy telling them about the droll things he saw, that he can hardly find time to eat. You can see how interested they all are in listening to him — his mother, his two brothers, and his

oldest sister, who has stopped with her ladle in her hand to hear the story. But his other sister, on the other side of the picture, does not seem to be listening to the story. She is holding something up to her ear, just as we hold the receiver of a telephone when we want to hear the message. What do you think it is that she is listening to in such pleasant surprise? If you look closely, you will see the coils of a shell. It is one of those lovely shaped seashells that people bring home from the other side of the world. I suppose her brother has brought home that shell and perhaps he has given it to her for her own.

FIG. 79. — The Blue Limpet's Hat. The Rose Limpet's Hat.

But what do you think a shell really is? It is a suit of clothes that Mother Nature made for a little creature that lived in the sea, or, rather, the good mother helped the little Mollusk, as he is called, to make the clothes for himself. He did not start in life with his shell full-grown. When he was a baby he had only a little cap of a shell, as it were, on his upper side. For the people who study him do not believe that he has much head. You can see this little baby shell right at the sharp end of the large shell which the boy's sister is holding to her ear. Some of the mollusks do not change the shape of the shell from this first cap-form. They just make the cap a little larger round, something as if your mother should make you a baby straw hat, and then as you grew larger you should sew on one braid of straw after another. If you should keep sitting on the ground all your life and should make your hat broad-brimmed enough, it would cover you completely up, as the shell of the limpet does him. And he has made it by adding

one braid of shell to another, as you can see by looking at the picture (Fig. 79). The little baby shell grows out of the mollusk's back, as the feathers grow out of birds and the hairs out of animals ; and as he gets larger, he pushes his skin out beyond the edge of the old shell and makes a new rim, and then another, and so on, as long as he keeps on growing.

But some of the mollusks do not like to sit on the ground holding their hat on all the time, and so they have contrived a differently shaped shell. As they have grown and made their hat larger braid by braid, they have changed it into a sort of basket into which they can get altogether and put the cover on, and so shut themselves out of harm's way. In the picture of the growing snails (Fig. 80) you can see that the smallest one — the one at the bottom of the picture — has a shell that he can pull himself into and be completely out of sight, though he has only just come out of one of those eggs. When he grows a little larger he looks like what you see at the top of the picture on the right-hand side, and when he is full-grown he looks as you see him in the middle of the picture.

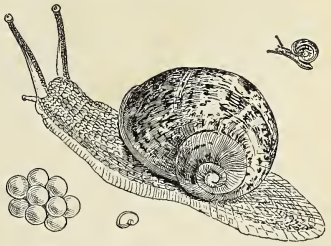


Fig. 80. — A Growing Snail's Growing Clothes.

As he grows he adds just enough to keep the shell the right size. If you look at it carefully, you will see the little rows of matter he has added from day to day. He twists it round as he makes it larger and so he can use the old baby shell as a part of the new clothes. He does not throw away his baby clothes, but on the largest shell you can see the first suit in

the tiny twist at the centre. When a bird comes along and tries to eat up Mr. Snail, he pulls himself into his hat and is safe; and when winter comes and tries to nip him with its frost, he gets into his clothes and makes an air-tight door, and then goes to sleep for the winter. In the water, as you see from the picture of the pond snail (Fig. 81), he can get along just as well as on land. If any hungry fish comes along, he goes into his shell, and the fish can harm him no more than the bird can his cousin on the land, though he gets killed sometimes, as you see from the empty shell on the right.

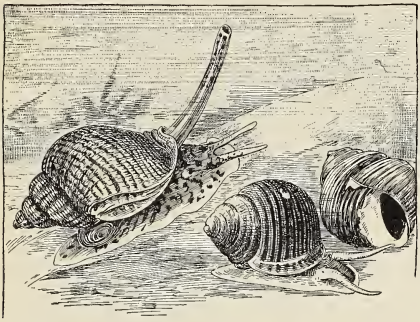


Fig. 81. — Water Snails and their Clothes.

There is another sort of mollusk that makes a still better suit of clothes for himself. He starts in life with a little cap on his back, something as the snail does, but his cap has a little hinge in the middle of it, so that it can be opened and shut like the covers of a tiny book. Perhaps it is more like a coat that is stiff on the sides but has hinges up and down the back. The oyster belongs to this coat-wearing family, and the baby oyster has a tiny shell coat that he can open and shut. You can see from the picture of the growing oysters (Fig. 82) how small they are when they settle down in life. The smallest — those specks at the bottom of the picture on the right — are only a few days old, while the largest at the top are a year old.

Each of the little ones adds a new layer to his coat as fast as he outgrows it. This layer is added to the inside of the coat and leaves the outside just as it was, so that even on the largest oysters you can see the tiny baby coats they wore at the very first. The baby coat is close to the hinge at the back of the shell, and then next to it comes the second coat that was put under the first, and then the third, and so on to the last coat of all, that was put on perhaps only a few days ago. It is something as if your father should still keep his baby coat, and all the other coats he ever wore, fastened upon the back of the last coat that he bought. That would make a pretty heavy coat, would n't it? And so you find the shell coats of the oysters are heavy, and they are thickest and heaviest close to the hinges, where all of them are kept piled up, one inside of another. If you should burn an oyster shell in the fire and then break one side of it into two pieces, you would probably see the different layers of the different coats.

Fig. 82. — Growing Oysters and their Growing Coats.

I do not think your father would be able to move about very much if he wore such a heavy coat as that. He would have to sit still in one spot, and leave the travelling to be done by people who

wore lighter coats. And so the oyster has to stay in one place, and leave the rest of the world to be looked after by some of Mother Nature's children who have not put on such heavy coats.

In the picture of the clams and mussels (Fig.83) you can see some more mollusks that wear this two-leaved coat. But their coat is not nearly so heavy as the oyster's, and so they can move about much more. The one at the bottom of the picture in front is the clam. He has stretched out his one foot on the right, and the tubes through which he gets his water on the left. But he can pull in his foot and his tubes so that they will all be inside the shell coat, and he can shut the two leaves of the coat so tight that you could n't open them with your fingers, if you tried ever so hard. Perhaps you never saw a live shell open, for these creatures always shut up their coats and button them when they are caught. But if you take one of the mussels that you can find in the rivers or ponds, and put it in a pail of water with sand at the bottom and watch it a few hours without touching it, you will see it cautiously open its coat and push out its foot and plough a little path for itself in the surface of the sand. In summer you can often see such little paths in the sand along the edge of ponds or streams, and if you follow them you can find the little traveller at the end of each path.

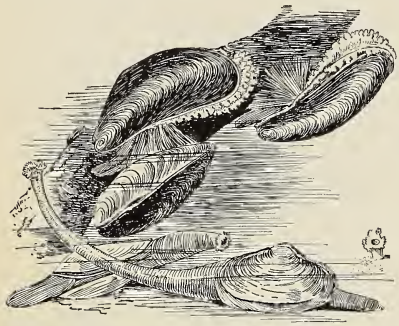


Fig. 83. — Clams and Mussels in their Shell Clothes.

But the salt-water clams that you see at the bottom of the picture do not live on the surface of the sand. They burrow down out of sight, and only thrust up their tubes to get fresh water, as you see one of them doing at the right edge of the picture. The other mollusks in the picture do not go on the ground if they can help it. They spin fine threads to fasten themselves to a stick or a stone, and open their coat to get food and drink. You can see the edges of their skin, or "mantle," as it is called, sticking out in a little white line just beyond the edges of the shells, with something that looks like little frills reaching out still farther; and in the clams also you can notice the mantle pushed out beyond the shell. This mantle somehow gets lime and makes it into new layers of shells. But the mollusks have to be very busy all the time getting material and making it into shell, if they would have clothes large enough to cover them, and stony enough to keep them safe from the waves and the hungry creatures on sea and land.

So you see how well clothed all these creatures are. They do not need feathers or hairs to keep them warm, as the birds and the beasts do, because they are just as cool as the water is, and so the water itself keeps them warm enough. But they need for their soft bodies something that the fish and birds cannot easily break, and they have what they need. And the wise little things seem to know enough to make their clothes over and keep them the right size and shape. How do you suppose they learned to do it? Who teaches all the baby clams, and baby oysters, and baby snails to make their clothes hard and stony outside and smooth as pearl inside? Whoever it is that does it must care a great deal for all living things in the sea as well as on the land, and must

know just what each thing needs, and just how to give it what it needs — feathers or hair to keep it warm, or bony plates or shells to keep it safe.

> Know'st thou what wove yon woodbird's nest
> Of leaves, and feathers from her breast?
> Or how the fish outbuilt her shell,
> Painting with morn each annual cell?
>
> EMERSON, *The Problem.*

TEACHING NOTE.

The value of specimens illustrative of these various kinds of clothing and armor cannot be too strongly urged upon the teacher. A teaching of nature that ends with the reading of a book is always faulty. Because the teacher has fixed impressions around all the materials drawn from the natural world, it must not be assumed that the names of them recall such to the children. While the pictures help greatly, they are liable to create mistaken images if not reinforced by actual substances which can be handled.

CHAPTER XV.

HOW MOTHER NATURE CLOTHES THE PLANTS.

"SPRING HAS COME AGAIN" is what the German artist is trying to tell us in this beautiful picture. You can see that the trees are all bare of their leaves still, but there are one or two blossoms in front of the little boy, and quite a cluster of them behind the dear little girl. I think she has in her hand a bunch of flowers, too, that she and her brother have gathered; and I fear that the thoughtless boy is trying to catch the butterfly that is sipping a little honey from one of the flowers. But what do you think the mother is looking at with such a happy smile

on her face? If you will follow her glance, you will see a tiny bird sitting at the door of his little house, up in the tree. Perhaps it is the first bird she has seen since the last summer. During the long, cold winter, when the ground was frozen and covered with snow, nearly all the birds have been far away in the warm south; but when spring comes they fly north and we see them again everywhere. And we are very glad to see them, not only because we love their charming ways, but because we enjoy spring and summer much more than we do winter. In winter we have to stay indoors where there is a fire, or, if we go out, we have to wrap ourselves up in a lot of warm clothes to keep Jack Frost from nipping our fingers and toes. The mother in this picture had to be very careful of that sweet little baby, and keep him well clothed and warm during the cold weather; and that little girl by her side, whose curly head she is caressing, had to be kept warm, too; while even the boy needed pretty thick clothes when he went out to play or to go to school.

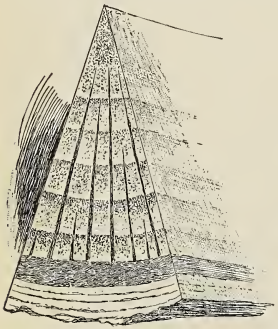


FIG. 85. — Piece of Oak Cut across.

But how do you suppose the trees and plants manage to live during the cold weather? They cannot fly away from the cold to a warmer land, like the birds. The tree in the picture has to stand right there all winter long, and so do the shrubs. And all the flowers are staying somewhere in the field or by the roadside till spring comes again. How do they manage to do it? Do they have clothes like all the other creatures? Certainly they do.

You can see the rough bark on the tree in the picture. That bark is the clothing of the tree, and wraps the trunk and branches of the tree all around. In the picture of a slice of oak cut across (Fig. 85) you can notice how thick the bark is at the bottom of the picture. You can see, too, that there are several layers of the bark, and the outer layer seems breaking away. Each spring the tree has a new layer of bark, a new suit of clothes, and the new suit is put on inside of the old suit. The tree is growing larger all the time, and so the new suit has to be larger than the old one. So the old one stretches and cracks more and more till it falls off, as you see it doing in the slice of the tree, or till it is taken off, as you see done in the next picture (Fig. 86), where men are taking off the outer and older coat of the cork oak. That bark is used to make stopples for bottles; and if you will look at one of the stopples you will see what the outer bark of the tree is like. This tree is called the cork oak, and Mr. Cork Oak has to make himself a new suit every spring, and each suit is between one and two inches

Fig. 86. — Taking off the Old Coat of the Cork Tree.

thick. Of course he has to be very busy in the summer making these new clothes. He has to reach out his roots and leaves for the stuff to be used in making the new clothes, and then he has to work hard early and late, spinning and weaving his cloth and making it up into garments; for he has to be his own tailor, as well as his own cloth factory. And he has to patch his clothes, too, as you will see if you cut into the bark, for he will soon cover the cut place with new bark.

But when winter comes and Jack Frost is about, the tender leaves and soft rootlets would be frozen, as your fingers and toes would if you left them bare all winter. So the tree makes some tiny new leaves before the winter arrives, and keeps them wrapped up in the bark or in a lot of warm scales, laid one over the other, as you see in the picture (Fig. 87) of the baby lily in its winter jacket. In the very centre of the picture is the baby plant which is to come out in the spring, and grow and blossom and bear fruit in the summer, and leave another baby plant snuggled away in wrappers for the next spring. If you should cut through the leaf buds on the trees, as on the horse-chestnut, you would find the same layer of wrappers and the same tiny cluster of new leaves for the next spring. And in some plants there are downy coverings to keep the baby leaflets still warmer. The mother plant has little, soft hairs grow, something like those in the picture of hair clothing (Fig. 88), to keep them from thawing and freezing in the winter and so being killed. I noticed one day in

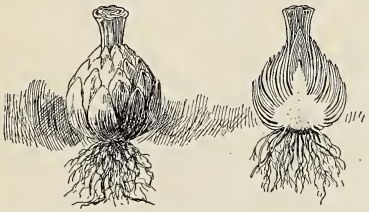


Fig. 87. — The Baby Lily in its Winter Flannels.

winter at Jackson Park that some of the new shrubs, five or six feet high, had fine, soft hairs thickly covering the upper, newer part of the plant, while the lower and older portion had only bare bark. Somebody, and not the city gardener either, had wrapped the tender part of the plant in hairs.

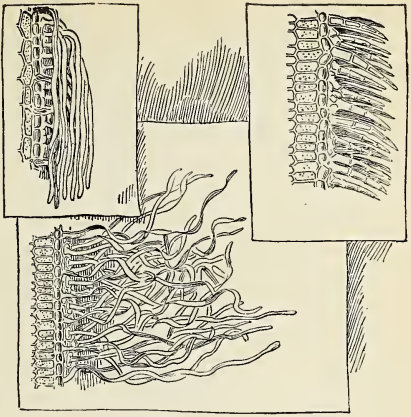


Fig. 88. — The Hair Clothing of Leaves.

But the baby seeds are even more carefully clothed than the baby buds. The mother trees are careful to wrap them up so that they cannot be harmed by sun or rain or hungry creatures. In the picture of the anatto seeds (Fig. 89) you see what safe baby jackets the little ones have on. They are covered with stout hairs to prevent the

Fig. 89. — The Anatto Seeds in Baby Jackets.

birds from eating them; and the jacket is thick to keep the seed from feeling the sun's heat too much, just as the burrs of the chestnuts are thick and rough for the same reason.

Fig. 90. — Seed Jackets in Sunshine and in Rain.

In the next picture (Fig. 90) — the one that is half dark and half light — you see how the babies are protected from the rain. The light side shows how the jackets are when the sun shines. You see there that all of the little coats are open and turned back at the top. The little collars are turned down, as it were. But as soon as it threatens rain, the collars are all turned up, as you see them in the dark side of the picture, which shows the same plants in a rainstorm. I don't know whether the mother tree turns up the collars or the baby seeds do it, or whether the coats turn up their collars themselves. That would be a fine sort of a coat that knew enough to turn up its own collar when rain came, would n't it?

But when the seed babies have been kept dry and comfortable long enough to be ready to go to sleep in the ground, the mother tree not only puts a bottle of condensed milk beside the baby, but she wraps a comfortable jacket about the baby and the milk both, as you see from the last picture, the one of the

lime babies (Fig. 91). In the ball at bottom of the picture you can make out the baby in its white milk and two different coats, and on the outer one you can see some fine hairs, to keep the little one still more comfortable while waiting for spring, during the long, cold winter.

Fig. 91. — The Lime Babies in Winter Jackets.

So you see how well clothed these baby plants are before they leave their mother tree. But after they have fallen to the ground and Jack Frost is hunting for them, somebody still looks after them and makes them still safer by spreading a great warm comforter over them. For the snow is a comforter to the baby seeds, and keeps them much warmer than they would be without it. And besides the snow there is another comforter still larger and warmer, which is spread over all of the tallest trees as well as over the plants and seeds that lie on the ground. This larger comforter is the air. You cannot see it but you can feel it when you try to run through it or when the wind blows it past you. This great comforter reaches higher even than the highest mountains and is wrapped about you and me as well as about the plants and animals. If it were not for this comforter we should all freeze to death in a single day. Somebody evidently loves all these creatures and keeps them from the cold, as the human mother loves and cares for her little ones — somebody who is wise enough to know how to make feathers and hairs, shell and bark, and a thousand other kinds of garments. But this wise and loving somebody makes all the children work for their

clothes — except, perhaps, the babies who have their mothers to work for them. The moment one of her children stops working, she stops clothing it. She will have no idlers in her great family.

> For well the soul, if stout within,
> Can arm impregnably the skin;
> And polar frost my frame defied,
> Made of the air that blows outside.
>
> EMERSON, *The Titmouse.*

TEACHING NOTES.

The studies of the properties of hair, fur, feathers, scales, etc., will suggest themselves, and the processes by which these substances are made available for our own use in clothing and ornaments.

The *Encyclopedia Britannica*, in the absence of other helps, will serve for added knowledge of clams, oysters, and snails, for which these lessons create natural occasion.

CHAPTER XVI.

HOW SEEDS LEARN TO FLY.

You see that one of the bubbles in the picture is higher than the other. The one that has been set free has not fallen to the ground, but has floated in the air and has even gone up higher than it was when the little girl blew it up. Why does it not fall? It is made of nothing but a drop of soap and water; and if you should take a little of the soapy water in a spoon and hold it up as high as your head and turn it out of the spoon, it would drop right straight to the floor. It would go so fast, too, that you could hardly see it. But if you take the same soapy water on the end of a clean pipe and blow it up till it is as big as your head, and

then set it free from the pipe, it will act very differently. If it falls, it will fall so slowly that it will take a long time to reach the ground. If it feels the slightest breath of air blowing upward, it will stop falling and begin to rise with the air. When I was a boy I used to have a place at home where on pleasant days the bubbles we blew would go sailing up over the house-top instead of falling to the ground. They did that because the south wind blew up the slanting roof of the porch of the house and so made an upward stream to carry the bubbles. But the drops of rain from the eaves of that same porch would fall straight to the ground, as a drop of soapy water would from a spoon.

The reason the drop falls, while the bubble floats, is because the bubble takes up so much more room than the drop, though they both have the same amount of water. When they try to fall through the air, the tiny drop has to push aside only a little air, while the big bubble has to push away a lot of air, and needs a long time to do it. So, too, if you take a newspaper folded up tight and drop it, you will find that it will go straight and quickly to the ground, but if you take the same paper and spread it out and then let it fall, it will take a long time to reach the ground. If a gust of wind happens along, it may sweep it a hundred feet or more before it gets to the earth.

In this same way Mother Nature's children can float in the air and sail a long way by spreading themselves out thin, like an open paper, instead of folding themselves up close. In the picture (Fig. 93) of winged seeds you can see three different seeds. The one on the right looks as if it had a pair of wings like a fly. That is the seed of the sugar maple, the tree that gives us our maple sugar. When Mrs. Sugar Maple has her

tiny baby put to sleep and packed away in his little seed-case and ready to start in life for himself, she does not drop him right down on the ground by her own feet. The baby tree could not grow there because he would be in his mother's shade, and if all the baby maples dropped down there they would find no room and would be crowded to death. So Mrs. Sugar Maple sends her child into the world, something as the human mother does; only the human mother packs her boy's trunk and buys him a ticket on the railroad which will take him to some place where he can have a good chance to start in life, while the tree mother packs her boy's seed-case with food and gives him a pair of light, wide-spread wings. Then when the wind blows briskly some day, she bids him good-by and puts him aboard the wind-train to find a new home far away, where he can have more room than he would have close by his mother, and crowded in with all his hundreds and thousands of brothers and sisters. If you will watch the seeds of the maple trees as they fall on a windy day, you will see how far they can float before they finally reach the ground.

Fig. 93. — Some Seeds with Wings.

The elm tree also gives its baby plant wings, as you can see in the middle seed of this same picture. That is the seed of our American elm. It has its covering spread out thin all around it and then pressed down flat, so that the wind-train will carry it far away from its early home. The seed on the left of the picture is that of the white ash. Mrs. White Ash has given her boy a ticket on that same train that the others ride on. In the picture of the pine tree's

cradle (Fig. 94), you can see the way Mrs. Pine-tree sends her babies out into the world. The cone is her cradle, or rather a lot of cradles together in a sort of nursery. Each one of the scales of the cone is really a cradle, and while the baby pine is too young to start out for himself, Mrs. Pine-tree keeps the doors of her nursery shut by pressing the scales of the cone close together. But when the babies are ready to go she opens the doors and lets them float away on the wind-train. You see one of the cradles at the right of the cone with one of the pine babies still lying in it, and the other outside just ready to go flying away on the wind. In the spring you can find plenty of the cones in the pine forests, with all the doors open and the babies all gone.

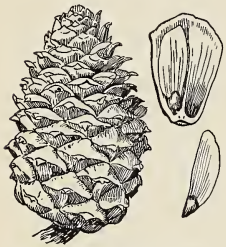


Fig. 94. — The Pine-Tree's Nursery.

The ash and the maple, the elm and the pine are all of them great trees, and they are tall enough to lift their babies high up in the air, so that they can go a long distance on the wind before they reach the ground, and so get far enough away from their mothers and their brothers to start life in clear places. But how do you suppose the low shrubs and little plants manage with their babies? If you will look at the picture of the dandelions (Fig. 95), you can see how one of the plants sends her children out into the world. I am sorry that I could not get a better picture of this plant, but I think you will remember how the dandelion looks, both with its yellow blossom and its white head of seeds. While the yellow blossom is open the stem of the flower is short, keeping it down close to the ground where it will be safe. But as soon as the flower

has faded, the stem begins to grow longer and lift the head high up into the air. At the same time the top of each tiny seed stretches up into a long, slender thread with a lot of delicate hairs sticking out at the end, making something that looks a little like a Japanese paper sunshade without the paper. You see these seeds with their Japanese sunshade on the head of the dandelion at the top of the picture, and at the bottom you can find one of them twice as large as it really is, so that you can see just how it is shaped.

Fig. 95. — The Dandelion and her Babies.

So you see that Mrs. Dandelion gives each one of her babies a sort of Japanese sunshade to spread in the wind. While the weather is damp and cold she keeps her babies snug and dry by wrapping them up in the leaves, that you see hanging down from the head of the flower. But when the weather becomes warm and bright she rolls down the leaves and lifts the head high on its stem and opens all the tiny umbrellas, one for each of her babies. Then the wind comes blowing along and catches up one baby seed after another in its arms and bears them up over the house-tops and the tree-tops, sometimes miles away from the place where their mother lives. Perhaps some of you have picked those round, white heads and blown the baby seeds off. When I was little we used to blow off the dandelion heads to see whether our mothers wanted us, and over in England the children do it to see what time it is. But the wind does

it to take the baby dandelions where they can have a good start in life. After a while, when the seed has reached some field or lawn, the wind lets it drop gently to the ground, and then the rain comes down and wets the seed and pats it into the earth. In a week or two you would find a tiny green plant starting up where the seed was, and next spring the plant would have grown into a dandelion with its own blossoms and its own baby seeds with their tiny umbrellas.

Another plant that helps its babies to float away from home is the cotton plant. You see it in the picture of the cotton baby (Fig. 96). The seed itself is no bigger than an apple seed, and you can see the little plant packed up in the one that is cut through in the middle. If the seed had nothing to help it float, it would fall right to the ground beside its mother and have no room to grow. But the cotton mother gives her child a lot of fine threads puffed out like a ball, so that the wind will catch it up and bear it away where it will have room to start life all by itself. Those fine, flossy threads are used to make cotton and twine. If you take a piece of cotton wrapping-twine and untwist it and pull off the floss from the end, you can make a ball, light and soft as feathers, that will go sailing away on the breeze, as the seed would if men left it to ripen and fall from the plant. But instead of doing that, it is picked off just before it falls and the floss is used to make thread and cloth. All the cotton cloth we have

FIG. 96. — A Cotton Baby, Whole and Cut through the Middle.

in the world is made by the mother plants. They make the flossy threads for their own babies, and then we borrow them for our own human babies as well as for grown-up men and women.

In the last picture of all (Fig. 97) you can see spiders floating in the air by just the same means that the seeds float. One of these wise little creatures climbs to the top of a post, when the wind is blowing, and turns its head toward the breeze. Then it begins to spin a lot of fine silky threads that stream out on the air, like the threads of the cotton seed. When enough of these threads have been spun to hold the spider, she gives a little spring upward from the post and goes floating along the air, till her wind-train brings her to some tree or field, where she can find more food than in her old home. Sometimes the warm currents of air, as they rise, sweep her up into the sky, so that she sails away many miles before she sinks down to the earth again. And it is the baby spiders especially who do this. Forty or fifty such tiny creatures, no bigger than the head of a pin, will leave their mother some pleasant day and come out of their home to climb a blade of grass or a bush. Then as they feel the wind blowing, one and another of the little band will boldly spin his silk threads and toss himself into the arms of the wind to be carried, like

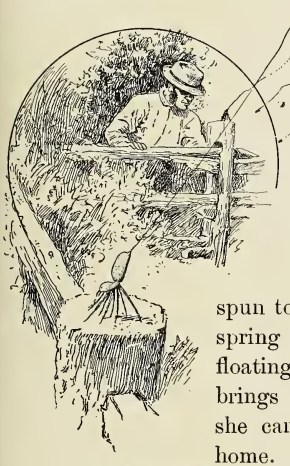


Fig. 97. — Spiders Spinning Wings.

Columbus, into new worlds. But they have no fear, for Mother Nature will take good care of them and of all her other children. The winds blow them into every nook and corner of the earth, so that the whole world is a garden, filled with the baby seeds growing to feed the insects, and the animals, and the men and women.

The winds that o'er my ocean run
Reach through all heavens beyond the sun,
Through life and death, through fate, through time,
Grand breaths of God, they sweep sublime.

Eternal trades, they cannot veer,
And blowing, teach me how to steer;
And well for him whose joy, whose care,
Is but to keep before them fair.

WASSON.

CHAPTER XVII.

HOW REPTILES AND MAMMALS LEARN TO FLY.

THESE girls are having a gay time sliding on the hard snow. There was a slide something like this, only very much steeper, behind the schoolhouse where I went to school when I was small. Whenever the snow was hard enough we used to slide on our feet down the hill — unless we lost our balance or caught our foot in some hole. If we did that, we used to go rolling down the rest of the way. Sometimes when it was icy we would put on skates and go sliding down the hill on them, and the skates would carry us twice as fast and twice as far. But it took a cool head and steady feet to do that. In some countries, I believe, they have snow skates made for sliding down the

long hills, or the mountains even, when they are covered all over with snow. But the safest and easiest way of sliding on the snow is to use a sled or a toboggan. You can sit down on the sled and get your big brother to steer for you, and you will go flying down the long hill and away off on the level snow at the foot of the hill. Or if you have two hills, as we did at home in Maine, you can slide down one hill and halfway up the other, and then walk up the rest of the way, and slide back almost to where you started from. Once when I was a boy the snow was so deep and the crust so hard, that I slid nearly a mile right over the tops of the fences that divided the fields.

Fig. 99. — The Flying Tree Frog.

That was very fine, was it not? But would it not be much finer to go sliding on the air instead of on the snow? I don't suppose you would feel brave enough to try to do that. Yet some creatures are brave enough to try to do it, and some of them are cool-headed enough to succeed in doing it. In the picture of the flying tree-frog (Fig. 99) you see a bright little fellow who has got some air skates, as it were, on all four of his feet. He lives in the trees on the island of Borneo. When he wants to travel about he climbs to the top of a tall tree and jumps out into the air, spreading his fingers and toes, so as to make four kites of them. On these kite-shaped air shoes he goes sliding down the air, reaching the ground a long distance from the tree where he started.

The picture of the flying dragon (Fig. 100) shows you another creature who has learned to slide on the air. This is a lizard, with feet and tail like most lizards. But besides the feet and tail, you see something along his sides that looks like wings. It is the skin of the lizard, and it is held out by the little creature's ribs. The last six or seven ribs on each side, instead of stopping at the edge of the body, are pushed far out, carrying the skin along with them, and looking something like the ribs of an umbrella. While the little fellow sits motionless on a tree, the ribs are bent back close to the body and the skin folded up like a closed umbrella. But the moment an insect comes flying within his reach he suddenly spreads out his ribs and gives a quick leap and goes flying through the air to catch his food. You see him doing this in the picture, where he has jumped from the branch to seize that fly by the tree trunk. Sometimes he slides a hundred feet on the air before he stops.

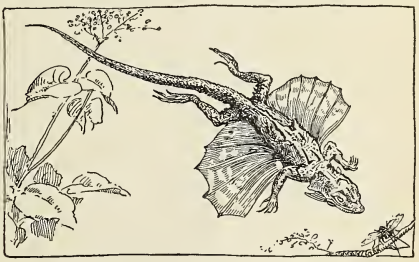


Fig. 100. — The Flying Dragon.

Another creature that slides on the air is the flying lemur that you will find in the picture on the next page (Fig. 101). You will notice that the skin of the one in the corner of the picture stretches from his fore-leg to his hind-leg, and also down to the tip of his tail. This turns him into a great kite when he spreads out his tail and legs, so that he can go sliding over the air a long way. Mrs. Flying Lemur, who is hanging to the branch of the tree, uses her loose skin as a sort of blanket to hold her

baby in. All day long she wraps him up in it and hangs herself from the branch of a tree, clinging by the long nails of her hind-feet. But when it comes night she goes sliding down the air to catch insect food for herself and her baby.

These flying creatures live on the other side of the world, but in our own forests we have a little flying squirrel, that has just such loose skin as they have, and uses it to slide on the air in the same way. We do not see him very often, because he sleeps in his hole by day and only comes out after dark. If you should go some summer afternoon into the woods where these flying squirrels live, and should sit down quietly till the sun set and night came on, you would have a chance to see them at their fun. First one little bright-eyed fellow would pop out of the hole in the tree where he had been sleeping, and then another would appear, and another, till the woods were full of them, and they would go chasing each other up the trees, as if they were playing tag. When one of them had chased his mate to the very topmost bough of the tree, the squirrel would give a spring out into the air, with paws and tail outspread, and go sliding down the air from the tree-top almost to the ground.

FIG. 101.—The Flying Lemurs.

But the moment when she seemed just going to touch the earth, she would bend her body and curve upward from the ground, so that she would come to a stop part way up another tree a hundred feet away from the first one. Her mate would boldly take the same leap and go coasting down the air and up the other tree. But before he could catch her, she would have scampered up the tree and jumped again from the top to another tree. And so they would coast back and forth on the air, as we used to coast on the snow, sliding down one hill and part way up the other, and then climbing to the top of the second hill and coasting back again. They seem to enjoy it just as much as you enjoy coasting, and I suppose it takes a cool head and a brave heart to do it so well.

FIG. 102. — The Common English Bat.

But though they can slide so skillfully they cannot really fly, as the bats can. You see the common English bat in the next picture (Fig. 102), flying up high in the air. He has stretched his skin out so far that he has made leather wings of it, and can fan himself along through the air very fast. He has reached his hands out so earnestly in trying to fly that his finger-bones have become about as long as his arms. For if you look closely at the picture, you will see that the four ribs of his wings are really the four fingers of his hands, his thumb being that little claw that sticks up at the top point of each wing. In the picture of the vampire (Fig. 103) you can see

the finger-bones still more plainly, and you will notice that this creature has his middle finger twice as long as his arm, and longer even than his whole body.

But the bat did not get such large wings and learn how to use them so well all at once, I am sure. He got them little by little, and he learned to fly little by little, learning to slide first, and then to fly a short distance, and then a longer distance, till at last he had larger wings than the squirrel or the lizard, and could even slide up hill by fanning the air with his wings. But in getting such fine wings the bat lost the use of his hands for anything but flying, as you can see from this same picture (Fig. 103), where one of the vampires is trying to walk on the ground. He is very awkward, and no wonder, for he has to walk on the thumb nails of his fore-legs and the weak toes of his hind-legs. So he does not alight on the ground if he can help it. Even when the mother bats have little ones, they fly about with them tucked snugly away under their arms. Sometimes when a bat gets caught in a room at night, if you look closely under her arm you will find a baby bat there clinging to its mother's breast, and covered up by the wing as well as by

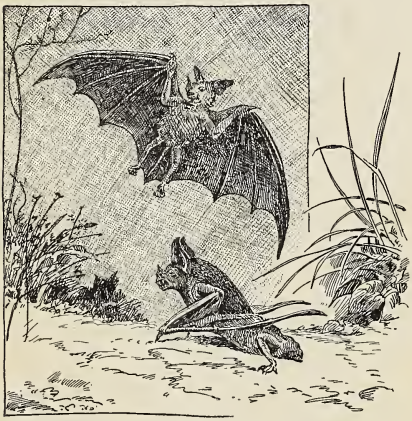


Fig. 103. — The Vampire Flying and Walking.

the arm of its mother. The mothers carry them and care for them when they get to be quite large. A boy here in America once caught a young bat, and when he was carrying it home the mother flew round and round him, trying to get it, and at last she alighted on his hands where he had the little one, and refused to be driven away. She would rather be caught and killed even, than desert her child.

In the next picture (Fig. 104) you can see the kind of creatures that used to fly all over the earth long years ago, before there were any men, or any horses or cows on the earth. These creatures are called "wing-fingered," because they had such a long finger on each hand to stretch out their wing for flight. It is the little finger, and yet it is as long as the whole body. Some of these creatures were as much as twenty feet across from the tip of one wing to the tip of the other, so that their little fingers must have been five or six feet long. They look very much like bats, but they were more like birds or reptiles than like bats, because they did not nurse their babies as the bats do. They probably left them to hatch out from eggs in the sand, as the alligator does.

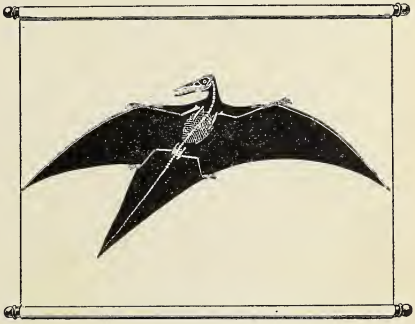


Fig. 104. — The Wing-Finger Flying.

This greater care that bats have for their babies is the reason we find bats all over the earth now, but do not find any of

the wing-fingers alive anywhere. The wing-fingers got wings quite as good as the wings of the bats, but they did not learn to nurse their babies and care for them as the bat mothers do. So the bats grew in number and strength because their children were so well cared for, while the great sharp-teethed wing-fingers grew less in numbers and strength because they did not care for their babies well enough. I suppose that one reason why human beings have spread all over the earth and got ahead of all other creatures in the world is because the human mother cares for her baby more than any other creature cares for its baby. If the human mothers should stop caring for their babies most, I suppose human beings would soon be left behind by some other creature that cared more for its babies. If we want our babies to live and be masters of the earth, we must make them just as good as we can — feed them, and shelter them, and teach them, so that they will know what is right and be strong enough and brave enough to do it.

What is excellent,
As God lives, is permanent.

EMERSON.

TEACHING NOTE.

It requires but a small stretch of fancy to make each maple, elm, or cotton-seed fly by an impulse all its own, and much has been written in this line of late, partly in the interest of nature teaching and partly for ethical purposes. It seems to us the better, safer teaching for both these standpoints to lay the emphasis on the impulse at the Heart of things. This does not rob each little life of its share in the great upward movement of life, but does not lay upon it more than it can bear, and so throw the teaching into disrepute from a scientific point of view.

CHAPTER XVIII.

HOW BIRDS LEARN TO FLY.

This hungry fox saw these birds resting on the shore of the lake, so he crept up to them as silently as he could, and then he suddenly sprang upon them. He thought he had surely caught one of them. But he only caught the bird's feathers,

which you can still see in his mouth. The bird herself instantly spread her large, strong wings and went flying away through the air with her mates, as you can see them doing at the right of the picture. Their wings have saved them from this hungry animal. And the wings of birds can carry them over wide lakes and oceans, and even over mountains, hundreds and hundreds of miles, and very rapidly, too, for some of the birds

can fly two or three times as fast as a railroad train goes. How have the birds managed to get such fine wings? And how have they learned to use them so well?

Long ago, before there were any birds flying through the air or any dry land even, when the waters covered all the face of the earth, such creatures as you see in the next picture (Fig. 106) were paddling about in the ocean and learning to lift their heads up higher and higher, because in that way they could catch insects and other food better than the short-necked creatures. When the dry land came they scrambled out of the water and learned to use their hind-feet to stand and walk with, so that their hands and arms were left free.

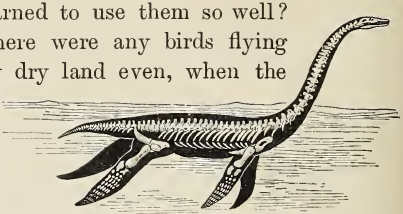


Fig. 106. — The Grandparent of the Lizards and the Great-Grandparent of the Birds.

Fig. 107. — The Bird-Snake.

In the picture of the bird-snake (Fig. 107) you see how these creatures got up on their hind-feet, and even on their hind-toes; for the heel of this bird-snake is not on the ground. It is up as high as where the tail begins, so that he is really walking on his toes. The grandparents of the birds were like this creature, only they had feathers on their bodies where he has scales, and their arms were

long and strong, while his are short and weak. I suppose they got their better arms by working harder in climbing the tree to escape from savage animals and to get better food for themselves and their children; and I think they must have got their feathers by trying to slide through the air, as the flying squirrels and reptiles do. When they tried to spread out their scales in order to make themselves lighter, Mother Nature changed the scales little by little into feathers. She is so kind to her children that if they wish to stay in the water or mud, she gives them scales that will let the mud be easily washed off. But if they are brave and loving enough to come out upon the ground and nurse their little ones, she gives them hair instead of scales. And so, if they are daring enough to try to live in the air, she gives them feathers — soft and light and yet long and strong.

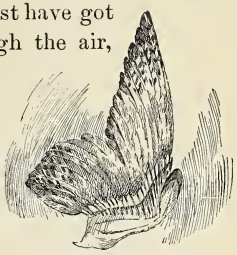


Fig. 108. — A Bird's Wing.

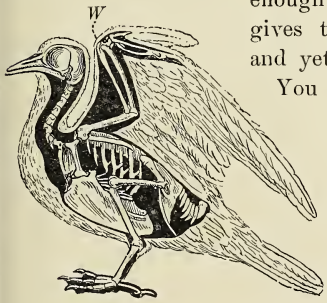


Fig. 109. — A Dove in Three Parts.

You can see some of those light, yet long and strong feathers in the picture of the bird's wing (Fig. 108). That is really the bird's arm, and the feathers are growing out of the skin of the arm. In the picture of the dove in three parts (Fig. 109) you can see the bones of the arm raised above the dove's body. The black part of this picture shows you the dove's body, and the lighter part outside is the feathers, while the lighter part inside is the bones.

If you look carefully at the dove's wing, you will notice that the wrist — marked "W" — is just above the dove's head, and the hand, which is also covered with long feathers, is folded back. When the hand and arm are straightened out, the long, wide feathers are spread out into the air like an open fan, and make a long wing, with the edge of the feathers lying over one another. If you watch your canary bird when he stretches his wings, you will see how long he can make them. You can see how large they are and how fast they move in the pictures of the heron flying (Fig. 110). It looks as if there were five birds in this picture, but there is really only one bird pictured five times. A Frenchman who wished to know how the birds used their wings in flying, made a camera that would take ten pictures every second, or six hundred every minute. The camera was shaped like a gun and he aimed it at a flying bird, but he did not shoot the bird. He only took one picture after another so quickly that the five pictures you see were taken in just one-half a second. They show how the bird moved her wings during that short time. The first picture you see beginning on the left shows the wings spread downward and in front of the bird. In the next the wings have gone part way up, and in the third picture they are stretched up to their highest and widest point. Then in the fourth picture they are coming down, and in the fifth they are just where they

FIG. 110. — Five Pictures of a Heron Flying.

were at starting. But during this half-second the bird has moved forward five or six times her length. She keeps up this swift motion up and down one hundred and twenty times a minute, — almost as fast as you can count, — and fans herself forward sometimes two or three miles a minute.

But of course the birds did not get their fine feathers and swift wings all at once. There was a time when they had long tails on their bodies, and sharp claws on their hands, and teeth in their mouths, as you see in the picture of the ancient birds (Fig. 111), where the teeth can still be seen in the bill, and two claws at the middle of the upper side of the wings. But Mother Nature soon taught them to fly so well that they no longer needed claws on their hands for climbing; and she taught them to steer themselves by long feathers instead of using that heavy, clumsy tail; and she helped them to pack the useless bones of their old tails together, as you see them in the tail of the dove (Fig. 109). She showed them, too, that they could build their nests and feed their little ones a great deal better without any sharp teeth in their bills. So she helped them to change their mouths into that of the dove. But when they had lost their hands they learned to use their toes for holding things, and sometimes the bird mother will take one of her little ones in her claws and fly away through the air with it and carry it to a place of safety.

Fig. 111. — The Ancient Birds.

But perhaps the finest thing that Mother Nature taught her feathered children to do with their wings was to fly away to the sunny south when the cold winter came in the northern lands. You see the swallows gathering for their flight in the picture (Fig. 112). The summer leaves have fallen, the sky is dark with storm clouds, and so the swallows know that the winter is at hand. So they gather in great flocks, sweeping through the air or perching on the trees or buildings, and chattering in their cheerful, excited way, as if they were all talking at once about their trip. In a day or two they have all gone, and while we are shivering in the winter's cold, where do you suppose they are? Mother Nature has guided them to the southern countries, a thousand miles away.

Fig. 112. — Swallows Gathering for their Fall Trip.

When the spring returns she will lead them back again, so that they will escape the parching heat of the southern summer, as well as the freezing cold of the northern winter. This long flight they must have learned about little by little, like everything else. At first when winter came, they flew only a few miles south to find better food and warmer air, and then when spring came they flew back north to their old homes again. But they found the food and climate so much better by going south in winter and north in summer, that they

flew farther and farther each year, till now they will go over wide oceans even, and high mountains, each spring and fall, and nothing can keep them from starting, when the time comes. Only their little ones will sometimes hold them back.

A man in England one fall noticed one pair of swallows linger about their nest long after all the rest had flown away. So he climbed up and looked into the nest to see what kept them. And there he found one of their children with its foot caught fast in a hair of the nest, so that it could not get away. He thought he would leave it there to see how long the parents would stay and feed it, and so he left it till Christmas. But it grew so cold then that he took pity on the birds and cut the hair. Then all three went flying away from the cold north to the sunny south, changing winter for summer, as the other birds had already done. Perhaps they pitied the human beings they left behind them in the cold country. It may be that they thought that they were themselves the most favored of all Mother Nature's children. Certainly they seem the happiest— so happy, indeed, that their gladness overflows in the flood of song that comes rippling from their tiny breasts. I suppose their joy comes from the fact that they have dared to do the boldest and hardest thing that they could see to do. Mother Nature urged them to go higher and higher — out of the water and out of the mud ; up from the ground to the trees, and up from the trees to the sky itself. They took every upward step they could see to take, and grew safer and happier with each new step.

But I think human beings have taken a higher and nobler step even than flying. When we choose to think about this world of ours and try to help make it better, we tried to do a bolder deed than flying with feathered wings. We tried to fly

with our brains, to send our thoughts back to the past and learn how this world was made, so that we might understand it, and be able to make it better in the future. We have tried to send our thoughts flying to the moon and the sun and the stars, in order to understand them. That is a far higher flight than any bird has dared. So we ought to be as happy as the birds, if we are only willing to take all the new and higher steps that we see ought to be taken with our brain — to try to help the whole world to live nobler and purer and more loving lives. And we have hands to work with, while the birds have lost their hands in getting their wings.

Here sits he, shaping wings to fly.

TENNYSON.

TEACHING NOTES.

It will be interesting in this connection to consider the difficulties which have attended the efforts of man to invent something which would correspond to the organs of flight in the bird.

Magazines afford pictures of the clumsy looking appliances called flying machines. The uncertainty which still exists in guiding the balloon shows that man's flight must for the present be chiefly in the lines of spiritual endeavor. A child's ambition should lie rather in the power and will to lift himself out of conditions of temptation and evil as the bird rises to higher levels promptly when there is danger on the ground. This is much better than doing poorly what the bird can do so well.

CHAPTER XIX.

HELPING EACH OTHER IN THE EARLY FAMILY.

"RING-A-RING-A-ROUNDER" is what the painter of this picture calls it. I suppose that is the game those merry little children are playing. I am not sure that I know just what game it is, but I am sure that all of you have played such

games as this, where we all take hold of hands and sing and march or dance around. I am sure, too, that you were all of you a great deal happier doing that than you would have been trying to have a good time all alone by yourself. In order to

be as happy as those children are, we need some help from others. One child cannot play "Ring-a-Ring-a-Rounder" all by himself. He must get some others to help him. Then he can be happy, and he will find that he is helping them to be happy, too, if he does all he can to play fair and be gentle and kind and loving. I think he will find he is happier himself when he tries to help others to be happy, than when he is trying to have them help him to be happy.

This happiness which comes from helping others is what Mother Nature uses to coax all her children to take hold of hands and help each other, as the children in the picture are doing. She makes us happy when we help others, so that we will want to help others all we can, because it is only by helping others that men can do much in this world. When Mother Nature began with this world, she did not have any children so large as men and women, or even so large as girls and boys. Her largest children were like the tiny monads with which she began when she tried to teach living beings how to walk and fly. Those monads were so small, you remember, that we could hardly see them, except when they lighted up the ocean at night. Of course such tiny creatures would need to take hold of hands even more than we do. If you will look

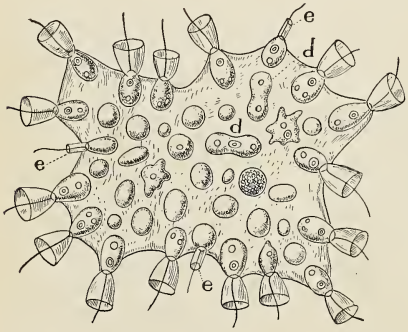


FIG. 114. — Grandparents of the Sponge.

at the picture of the grandparents of the sponge (Fig. 114), you will see how they began to take hold of hands and help each other. Each one of those little black spots represents a tiny creature who can live all by himself if he wants to. If you should take a drop of water in which hay has been soaking, and look at it through a magnifying glass, you might see one of these little fellows all by himself, with his collar around his neck and his tongue sticking out, to sweep in any food he might find. And if you should watch him long enough, you might see him grow larger and larger, until he was big enough for two. Then he would divide himself in the middle and you would see two creatures, each with his own collar and his own tongue. But instead of each of these little fellows going away to play by himself alone, as the monads do, you would find that they would stay together, and they would look as if there was a drop of mucilage or jelly holding them. And each of these would divide into two more, and these into still more, while the jelly drop would also keep growing, till you would have something like what the picture shows you — a whole cluster of little creatures living together in a drop of jelly. You will notice that the outside ones alone have tongues and collars. They get the food for all of them, while some of the others digest the food and make more of the jelly-like matter they are living in. The rest grow and divide, as you see some of them doing in the centre (those marked "d"), and so make the babies of the family. These babies grow up and creep out to the edge, get collars and tongues, and help the rest; while those who have been on the edge sometimes take off their collars and pull in their tongues and go into the centre, as those marked "e" seem to be doing.

That is the way these tiny creatures take hold of hands and

play their little game of helping each other, some of them getting food while others are resting, or are caring for the babies. And all of them are safer than they would be alone, because by helping each other they can build up a house for themselves. The sponge you have had in your hands so often was the home of tiny creatures like these. It starts with one little being, dividing himself again and again, till he becomes a great family of creatures. The family settles on a rock at the bottom of the sea and spins fine fibres to make a safe house for the millions of little creatures that live together in it. No one of the tiny creatures by himself alone could have built up such a large house. But even if he could have done it, just think how lonesome he would have been in it, like one little child in a great house. But with the millions of little ones crowding the sponge and helping each other from morning till night, what a happy time they must have !

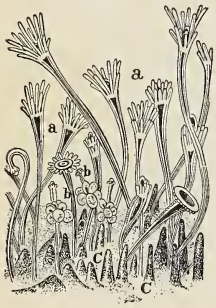


Fig. 115. — A Hydra Family.

In the picture of the family of Hydras (Fig. 115) you can see another way that Mother Nature has taught her children to help each other. Some of the family, or colony as they call it, have grown up high and got long fingers, which they stretch out into the water after food for the family. Those are the ones marked "a," while the shorter ones, marked "b," take care of the babies ; and at the bottom the thorn-like things, marked "c," are the ones that help both of the other two to be safe. When a dangerous fish comes swimming along and tries to eat up the taller members of the family, they bend down and lie flat among their shorter brothers, who bristle up so hard and

sharp above them that the fish has to go somewhere else for his dinner. When he is gone the taller brothers and sisters rise up again and go on looking after food and caring for the children.

These little creatures find it so much pleasanter living together than apart, that they never separate, as the grandparents of the sponges sometimes do. They have lived together so long helping each other in this way that they cannot change. The sponge grandparents could take off their collars whenever they wished to, and then put them on again. But the hydra food-seekers cannot change to baby-tenders, nor can the baby-tenders change to food-seekers; nor can either of them change into the thorn-like brothers. They have divided the work of the family up between them, and one does all of the guarding, another all of the feeding, and another all of the caring for the children. And they have taken different shapes, so that they can do their different kinds of work better than they could if they staid like the grandparent of the sponge.

Fig. 116. — A Pea Family.

The plants, too, have learned how to help each other by dividing their work up and each one doing something for all the rest. There are some plants that are like the monads. Each one is a tiny baby living all by itself and not taking hold of the hands of any other baby-plant, — something as if one little leaf on a tree should go away by itself, instead of joining hands with all of the rest of the leaves to build up a tree for a home to live in. Such plants have never learned how much

happier and safer and stronger they would be by joining hands and helping each other. But the pea has learned that lesson. In the picture of the Pea family on the preceding page (Fig. 116) you see how a part of the family push down into the ground and reach out for the food for all the family, while the others of the family climb up into the air and make themselves into leaves to do the breathing and get the sunlight for all of the plant. They breathe for the roots, and the roots suck in food for the leaves. In the game the pea children play, the leaves dance in the air and sunlight, while the roots do their dancing down in the dark ground. But I suppose they are all happy because they are all helping.

FIG. 117. — A Pea Leaf with Finger-Tips.

You will notice that there are some tiny tendrils just starting out above the leaves. Those tendrils are really leaves that have changed themselves into twining fingers to take hold of sticks or strings to help raise up the rest of the plant where the leaves can get air and sun, as you will see if you look at the next picture of the pea leaf with finger-tips (Fig. 117), where you will see that the upper part of the many-bladed leaf has round fingers instead of flat blades. If you should stand beside such a growing pea and hold your pencil out against the tendril, you would see the fingers bend around the pencil and clasp it tight in a few minutes

and begin to pull the plant towards it, something as a little baby's finger would clasp the pencil and pull himself towards it. And many of the plants will reach up their tendrils above the head of the plant and move them around in a circle to try to find something to take hold of.

In the picture of the fingers of the Virginia creeper (Fig. 118) you see another way that the leaf changes itself into tendrils and holds up the plant. In the upper part of the picture the tendril is reaching its fingers out to find something to take hold of, and in the lower part you see it after the fingers have found the smooth boards of a house to cling to. Five of the fingers have pushed their tips against the boards and had something like nails grow out and stick fast to the boards so that you can hardly pull them loose. You will notice too, how the fingers have grown thicker and twisted into sort of springs, so that the hardest wind that blows cannot blow the vine down. If you count the tendrils in the upper part of the picture where they are new, you will find there are eight, while there are only five on the lower part where it is

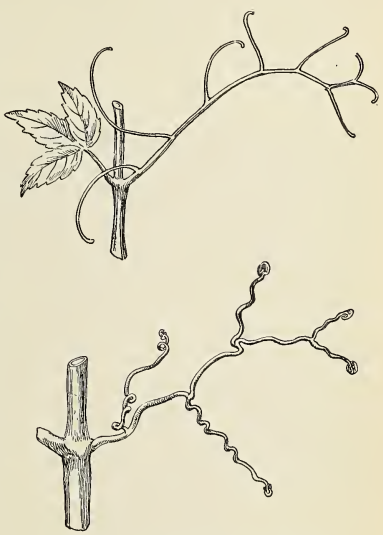


Fig. 118. — Virginia Creeper's Fingers.

old. What do you suppose has become of the three missing tendrils? They withered away and dropped off because they did not find any place to take hold and help the plant, while the five that took hold grew larger and stronger and lasted for years. Mother Nature helps those to grow and live who help the rest of the plant, while she lets those die that do not help.

So you see that the tendrils and leaves above, and the roots below are all working together to build up the vine. On a great tree like an oak or a maple, all the hundreds of leaflets and all the hundreds of rootlets are working together and helping each other to make the great tree tall and straight, just as the millions of little beings are working together to build up the sponge. Who do you suppose tells the little creatures how to make the sponge, or the vine, or the tree? Who plants it for them and tells the leaves what to do for the roots, and the roots what to do for the leaves? Who tells them both how to shape the tree and build the fibre of hard wood and of soft bark? Somebody must be looking out for them all and whispering to each one of them the right thing to do to help the others and to help the whole world, as the sponges, and the vines, and trees do. When they do not listen to that voice that whispers to them they are unhappy and pine away, and die as the tendrils do. But when they listen and obey they are happy and grow stronger and better.

Ever fresh the broad creation,
A divine improvisation,
From the heart of God proceeds,
A single will, a million deeds.

EMERSON, *Woodnotes.*

CHAPTER XX.

HELPING EACH OTHER IN THE SISTER FAMILY.

The older sister in this picture is helping her younger sister to dress in the morning, and the younger sister seems to like it very much indeed, if we can tell by the way she looks into her sister's face and hugs her sister's arm. And the older sister seems to think it is very pleasant too. She likes to be a sort of little mother to her sister, while her own mother is taking care of the baby. In that way she can help pay her mother for the care she gave her when she was herself a baby. Even if she did not remember the care she had when she was small, she loves her mother so much that she would like to do anything to save her mother work. I think, too, that she loves

her sister so much that she enjoys helping her, and is happier when she is working for her sister than when she is working for herself.

I have sometimes seen older sisters whose whole life seemed given to their younger sisters. You can see some of those older sisters among the plants in the picture of the daisy (Fig. 120). All of the broad white leaves circling the dark centre of the daisy — the petals, as we sometimes call them — are the older sisters of the little daisy family. The flowers of the daisies, instead of scattering themselves all over the plant, get close together inside what we call one daisy flower. If you should cut a daisy into halves and look closely at it, you would see the separate blossoms; and if you should use a magnifying glass the flower would appear like the piece of one of the flowers you see at the right hand of the daisy, marked "B." In that you can see seven of the baby blossoms, each a flower by itself, but all standing close together on the same stalk. You can see that the outside flower has a long, leaf-like petal which is called a ray. Each of the outside flowers has such a ray as that, and all of the rays make the white rim of the daisy. These outside baby daisies are the oldest of the family, while those in the centre are the youngest. You can

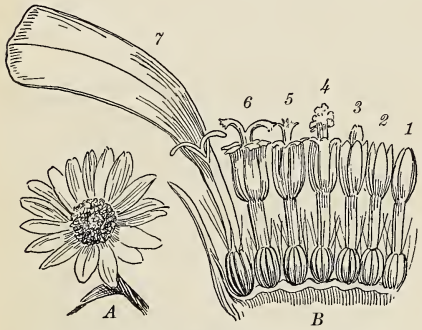


Fig. 120. — A Daisy and Part of a Daisy Family (magnified).

see in the picture that the tiny blossom numbered "1" is not even open yet, while the next one, numbered "2," is only just opening. But the outside blossom, No. 7, is opened widest of all. Like the oldest sister in the human family, she helps take care of the rest of the children.

In some of these plants living in families, when the weather looks like rain or when night comes, the fifteen or twenty oldest sisters who stand outside bend their white rays up over their younger sisters and so make a little white tent of them to keep the little ones dry and warm. When morning comes or the rain clears off, they fold their rays back again, so that their younger sisters can enjoy the sunshine. They put their baby sisters to bed each night and tuck them in out of the cold and wet, and they watch over them all day long. In the picture of the thistle (Fig. 121) you can see the tiny tent which the older sisters of that flower make for the baby blossoms at night or in rainy weather. The tent is on the left, and on the right you see the flower when the older sisters have let their younger sisters go out into the sunshine. Only the oldest sisters of the

Fig. 121. — A Thistle Family at Night and a Thistle Family by Day.

thistle are not flowers, but leaves that give their whole life to helping the mother plant care for the great family of babies. The plants that gather their babies into bands where the older sisters can look after the younger ones, and all of them can help each other, are the most successful plants in the world. There are more of this family than any other, and I imagine that they are more happy than any other, because they help each other.

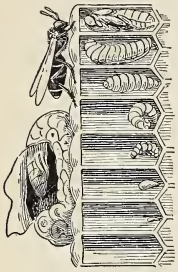


FIG. 122. — A Bee Caring for her Younger Sisters.

Some of the insects, too, have learned to help each other, and the older sisters have learned to help the mother care for the family. In the picture of the bee-sisters (Fig. 122) you see the older sister with wings helping to care for her half dozen younger sisters who have not yet got their wings. The youngest of the sisters — the one at the bottom — is only a tiny egg, which the bee-mother has laid in the cell. That egg-laying is all the mother does; the sisters do all the rest of the work. They feed the egg when it hatches into a little white worm and grows larger and larger and hungrier and hungrier. In a beehive there are thousands of baby bees needing to be fed very often, so you see the older sisters are very busy nursing their younger sisters.

But besides this nursing they have to build the thousands of beautiful white cradles for the babies to lie in while they are growing into bees with legs and wings. And they have to go out through the fields hunting for honey and pollen among the flowers. Of course one older sister could not do all these different things, so they divide the work up between them. Some of them hunt for honey, others build the cells or cradles,

and others feed the babies. There are still others that stand and make their wings go fast to fan fresh air through the hive, so that the babies and nurses will not stifle, or the wax cradles melt on hot days. Some of them, too, are watching at the entrance, as you see them in the picture (Fig. 123), so that no one shall come in to hurt the babies or steal their food. If you should drop a caterpillar down on the board at the door of the hive, you would see the guarding bees all start up and move about hastily and gather around the caterpillar. The caterpillar would have to creep away at a pretty lively rate not to get stung and pushed off the board by the bees. If you push a piece of straw five or six inches long into the door, the bees on guard would at once begin to look at it and feel of it and try to pull it out of the doorway. At last they would get it loose, and one of them would clasp her arms about it and fly away with it till she got forty or fifty feet from the hive, when she would drop it and come back again to guard the door.

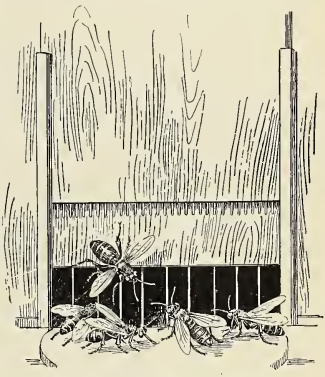


Fig. 123. — Bee Sisters on Guard at their Door.

If you could watch one of the sisters that was hunting for honey, you would find that she was up and at work before you had your breakfast, and that she was busy all day long hurrying from flower to flower, to get the sweet juice and the yellow dust, and flying straight back to the hive with her load, and handing it over quickly to her sisters in the hive, and then

starting out again at once for more honey and pollen. So the beehive is a great busy family, with one mother and thousands of daughters who do all they can to help their mothers and each other. I suppose this is why the bee family is so large and strong and the bees seem so happy. And if the brothers helped as much as the sisters do, I think the family would be still larger and stronger and happier. But the brothers do not help at all in the work of the hive. They are the "drones," who only eat and sleep through the summer, and when the cold weather comes their hard-working sisters drive them out of the hive to die of cold and hunger. No doubt Mother Nature tells the sisters to do it, and I think it serves the drones right. If they want to be safe and happy, they must help the others.

The ants are the cousins of the bees, and like them they have learned to help each other. Some of the sisters in the ant family nurse the baby ants, and others build the ant-hills or guard the doors or go off in search of food. When they are hunting for food they will sometimes help each other by the larger sisters marching on the outside of the line and doing all the fighting, while the smaller sisters march in the centre of the line and carry the food. And when they come to a stream which they wish to cross, the large ants will find a tree whose branches reach over to the other side of the stream. Then they make a bridge themselves, by having one ant hang down from the end of the branch and another hang down from her feet, and a third from the feet of the second, and so on, till the string of ants reaches the water or the other bank, as you see it in the picture of the ants helping each other to make a bridge and tunnel (Fig. 124), where a line of ants hangs from the end of the branch to the water's edge.

In the same picture you can see the covered passageway the

ants have built to keep off the heat of the sun. It would kill the smallest sisters of this ant family to be in the hot sunlight of Africa for a few minutes. So when they have to go out by day they keep in the shade all they can by going under logs and stones and leaves. But if they have to cross an open plain like the sandy shore in the picture, the larger sisters who are not hurt by the sun build an arched tunnel for their sisters to go under, made of their own bodies held together by clasping each other's hands and feet. If the space is too long for this, they build a tunnel of sand, as you see it in the picture, sticking the grains together so as to form a safe, covered way for their smaller sisters.

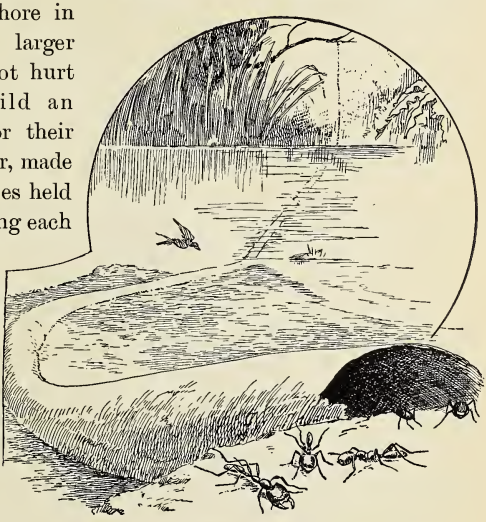


FIG. 124. — Ant Sisters Crossing a River and Building a Tunnel.

The ants in this country will make such a covered way to reach the little aphides — the ant-cows — which they keep on the trees. They will build the covered way along the ground and up the trunk of the tree, so that the birds cannot get them as they go for their milk; and they will even build a clay roof over the aphides, — a sort of cow shed, — so that no one else

shall milk their cows. But most ants would rather dig under the ground than make a tunnel over it, and sometimes they will make a tunnel under a stream twice as wide as the Chicago River, just to get at food beyond the water. All of the sisters take hold and help each other, and by so doing they can accomplish almost anything. They have learned to do these things by living together and helping each other, so that some scientific men think that next to human beings the ants are the wisest creatures living on the earth. They have listened to Mother Nature's teaching better than any other creatures except men, and she has helped them just as far as they have minded her.

For Nature listens in the rose
And hearkens in the berry's bell,
To help her friends, to harm her foes,
And like wise God she judges well.

EMERSON, *Nature.*

TEACHING NOTES.

Get the help, and encourage pupils also to do so, of local students of science.

Encourage the children to learn the shorter passages of poetry accompanying the text.

Bring in some composite flower to make the teaching real.

Make the descriptions teach the kind helpfulness of nature as well as her stern refusal to help those who do not help themselves.

Do not let the formal parts of nature obscure the truths you wish to teach. Remember it is not the formal part but the spiritual part through the forms which you wish to impress.

Give no more body than shows soul, as Browning says of painting.

CHAPTER XXI.

HELPING EACH OTHER IN FLOCKS AND HERDS.

"OFF TO AMERICA" is the name of this picture. Of course these children are not really going to America in that little boat, for they live in France, so that they would have to cross the wide ocean to reach America. But they have often

seen their friends go on board the great steamers and sail out over the ocean to go to America, and so they have taken their dolls and got into the little boat and are playing that they are "off to America." But I don't believe they would have felt brave enough to start out on the water so, if they had not had their older brother, or some one's older brother, with them to

push the boat from the shore and manage that funny little sail; and I think they would be a great deal safer if that brother was still older, or if they had their father along with them. If they were really going over the vast ocean, they would need a big vessel or steamboat, and a great many fathers and older brothers to manage it, unless they wanted to get tipped over by the big waves and drowned in the deep water.

The fathers and the older brothers have learned to protect the mothers along with the babies and the younger sisters, among the animals as well as among human beings. The animals gather in flocks and herds, with the fathers and brothers on the outside, and the mothers and sisters in the centre, and then the mothers and little ones are safe. Even the timid sheep can keep dogs and wolves off in this way. When the sheep are living all by themselves, without any shepherd to take care of them, they stay in small flocks and have one of the fathers or brothers stand on guard, watching for a wolf or any other dangerous animal. The moment the sentinel sheep sees such a dangerous animal he stamps his feet and gives a sort of whistle, and all of the sheep run together into a circle, with the mothers and sisters inside and the older brothers and fathers on the outside. And these older brothers have such large, strong horns and strike so hard with them that no wolf dares to come near enough to get hit. The only way the wolf can catch a sheep is by watching till one of them strays a little from the flock, and then rushing upon it and carrying it off before the fathers and older brothers can get to it to protect it. So the sheep all stick very close to each other when they are nibbling the grass and when they are lying down to rest.

And larger animals, like the buffaloes, protect themselves in the same way. They form a big herd, having the sisters and

babies inside, and the older brothers outside, with their shaggy heads and long horns turned towards the dangerous animals. The wolves do not dare to attack them then, because the buffaloes will rush at them and toss them in the air with their horns and often kill them. To get a buffalo the wolves have to do just as they do with the sheep — watch till they can find one at a distance from the herd. But even then the wolves have to help each other, for the buffalo is too strong for one or two of them. So when they find a buffalo that has gone away from the herd a lot of them gather around him, as you see them in the picture (Fig. 126), and some of them will attack him in front and others will come up behind, till they tire him out. Then they will rush in all together and drag him to the ground. But the man who drew this picture rode up to the wolves and drove them away from the buffalo, so that he went galloping off to try to get to his herd, where he would be safe.

Fig. 126. — A Pack of Wolves Hunting a Buffalo.

The next picture (Fig. 127) shows you the way the elk help each other to keep the wolves off in the winter. These large deer have no fear of the wolves in the summer, because they can easily outrun them or toss them off by their horns. But when winter comes and the ground is covered with snow, the deer sink deep in the snow, so that they can neither run nor use their horns. Then they gather together in herds and tread the snow down, making an "elk-yard," as it is called,

where the sisters and mothers can be safe on the hard snow or the ground in the centre. At the bottom of the picture you see a hungry wolf looking into the yard, and one of the older brothers of the herd looking out at him. You can see other deer lying down in the middle of the yard, and at the top of the picture there are more hungry wolves looking into the yard from the other side. But the deer do not fear even a whole pack of wolves, because they can help each other in keeping them off.

Fig. 127. — The Elk-Yard.

The monkeys, too, have learned to help each other. When an eagle tries to carry one of them off, all the rest of them rush to his help and beat the bird and pull its feathers out, so that it is glad to let go its hold on the monkey and fly away. And when they have to go from one place to another and have to cross a river, they will make a chain by taking hold of hands, something as the ants do, only it is the big brothers instead of the big sisters who make the monkey bridge. They climb a tree that overhangs the water, as you see them in the picture (Fig. 128), and then they hang down from one another till they have a string of monkeys long enough to reach across the water. Then they swing back and forth till the monkeys at the end of the string can catch hold of a branch and hold fast. After that the sisters and the babies walk over this live suspension bridge, and sometimes the roguish little monkeys will slyly pinch or slap their elders who are holding fast in the

bridge, so that they cannot punish them for it. When the sisters and babies have all crossed over, the first monkey lets go his hold on the tree, while the other monkeys hold fast and pull him and all the rest of the bridge across the river.

And when the monkeys are attacked by dogs, the fathers and the elder brothers will face the dogs and roar at them so loudly as to frighten the dogs and keep them off, till the sisters and babies can reach some safe place. A German traveller, who spent his life studying animals, tells us that once when the dogs rushed at the monkeys and were kept off by the older brothers, one of the youngsters among the monkeys got somehow separated from the rest and climbed a rock, where he was surrounded by all of the dogs barking and jumping at the poor little fellow. But when the other monkeys saw him, one of them—I don't know whether it was his father or his oldest brother—left the rest of the band of monkeys and came alone down among the dogs to help the little one. He looked so brave and threatening as he came, that the dogs were afraid to touch him and slunk back, so that he could go straight to the rock, where he coaxed the little one down and carried him safely up the hill to the rest of the monkeys. That was a pretty good sort of a big brother to have, even if it was a monkey.

Fig. 128.—Monkeys Making a Live Bridge.

The birds, too, have learned to be safer and happier by helping each other. In the picture of the sociable weaver bird's home (Fig. 129), you can see what a large house they build

when they work together. That great pile of hay, stacked up in the tree, was gathered by the birds and put into place, one blade at a time. A single pair of birds could not do it, but two or three hundred pairs working together can do it easily. Each one of the hundreds of pairs has its own nest under this roof, which keeps off the hot sun by day and makes a warm shelter at night. You can see the different nests at the side of the picture. The roof also makes them safer from the monkeys and hungry creatures who would like to steal their eggs and babies. When there are so many birds together, there will always be dozens of them at home to join in defending their house against such dangerous creatures. So they are a great deal safer, just as the swallows are who gather in crowds to build their nests in the same barn.

FIG. 129. — The Sociable Weaver Bird's Home.

When any creature tries to hurt any one of the swallows, all the rest come to the protection of that one. The English sparrows will sometimes steal a nest that the swallows have made by getting into it as soon as it is finished and holding it. One pair of swallows is no match for the sparrows, but other swallows will come to their help and punish the thieves. In one case, when a thieving pair of sparrows had driven some swallows from their nest, they came back with some other swallows and tried to drive the sparrows away. When they could not do that, they all went to work and tore the nest down

and got rid of the sparrows that way, and then they helped build the nest up again. In another case, a lot of swallows came with clay in their bills and actually built up a wall in the opening of the nest, so that the thieving sparrows were shut up in prison, as it were, and could not get out but starved to death there.

But the crows help each other even more than this. Whenever a flock of them is busy getting food, one or two of the number will always be perched up on some high point and will be keeping watch. The moment the sentinel sees or hears anything that seems as if it would harm them, he calls out to the others and they all fly away to a safe place; or, if it is some great bird that is prowling around to try to catch their babies, they will all join together to drive her away, as you see them driving the owls away (Fig. 130). And the rooks, who are the English cousins of our crows, will all join together to punish any pair that is caught stealing the sticks from another pair's nest to use in building their own. When a pair is found out doing this, all the rest of the rooks cry out as if they thought it wrong, and go flying to the nest of the wicked pair and tear it all down and scatter the sticks in every direction. It is only the young pairs who try to steal from each other; the older ones have learned that they can live in flocks only by helping each other, and that the moment they begin to harm each other in any way they will scatter the flock and lose all

Fig. 130. — Crows Driving an Owl away.

the safety and pleasure that comes from living together. And they will lose all their education, too, for it is only by living together and helping each other that Mother Nature's children are educated. The swarms of bees and ants, the flocks and herds of birds and animals, are the school to which living beings are sent to be educated. So we find the ant and the bee family the wisest of the insects; and the crow family the wisest of the birds, and the animals that go in flocks and herds the wisest and gentlest as well as the strongest of the animals.

United we stand; divided we fall:
It made and preserves us a nation.

MORRIS.

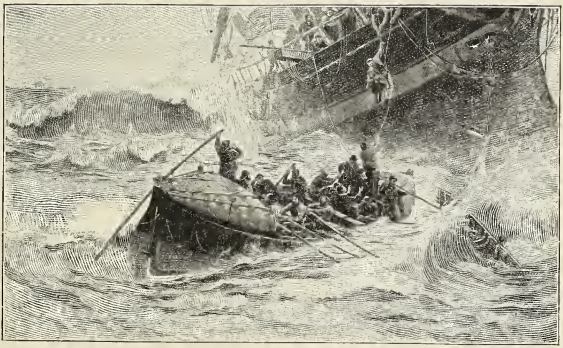
TEACHING NOTE.

The helpfulness here suggested should be made a starting point for subsequent illustration in little themes and oral exercises drawn from the natural world. This teaching from time to time is the only sure means of rescuing the seed sown from the "fowls of the air" that seem especially to attend children in this volatile period of their lives. The reading of the book is but the initiative in a line of careful nurture. It makes a few strong centers around which its ideas of cradling, tending, feeding, clothing, etc., may radiate to fix impressions otherwise too fugitive to be of their best value.

CHAPTER XXII.

HOW HUMAN BEINGS HELP EACH OTHER.

Mr. Henry, the man who painted this picture, calls it "Women and Children First." It is a shipwreck. That great vessel has been driven upon the rocks by the wind and the waves. You can see the waves rising and breaking over the stern of the ship, so that the people who were sailing in the



boat have had to run forward to the bow of the vessel where they are crowding against the rail. In a little while the mighty waves will break the vessel all to pieces, and sweep the men and women and little children into the water; and with such terrible waves rolling and breaking, I fear they would all be drowned. Certainly all the women and children would be.

And they have no way of saving themselves, because all their small boats have been swept away by the waves.

But you see that large, strong boat in the centre of the picture, that has come rowing out over the wild waters right up to the stranded vessel, to save the poor shipwrecked people. Those men in the boat have risked their lives to save the men and women and children who were in such terrible danger. Their large, strong boat was built on purpose to save shipwrecked people. The men who row it live on the shore in a house called a Life-saving Station. We hire them to stay in the station night and day, with their boat all ready to be used at a moment's warning. One of them is always looking out for ships that may need their help, and when it is stormy some of them walk up and down the shore for miles to see if there is any shipwreck. The moment one of them sees a ship in danger, he tells the rest of them and they spring into their boat and row right out into the wildest waves to help save their fellowmen. You see in the picture that they have rowed up to the side of the vessel, and the people on the vessel are lowering the "women and children first" into the lifeboat. They have let down one woman, who is sitting in the middle of the lifeboat and stretching her arms up to the ship. For you see her little girl is being lowered next, held fast in the strong arms of the man who is slipping down the rope. When the lifeboat has all the women and children and as many men as it can carry, the boatmen will row to the shore and leave them there, and come back and save the rest of the men. But these brave boatmen never could spend all their time helping to save others, unless we helped them in turn by giving them shelter and food and clothing for their wives and children. But our help does not pay them for their courage. Only our gratitude and love and honor can do that.

In the next picture (Fig. 132) you see three or four men rushing out of a cave to save one of their number who has been attacked by the cave bear. That terrible creature has struck his sharp claws into the man's shoulder and knocked him down upon the ground, and I fear he would soon have killed the poor fellow if the other men had not heard his cries and rushed up to save him. One of them has a heavy club, and the other two have stone axes, and they will drive the bear away and save their friend. That was the way men used to save each other long ages ago, before they had steel axes or guns, or clothing, or houses to live in. They lived in caves, as you see in the picture, and wore the skins of wild animals. But they had already learned to help each other. They lived in little bands of a few men, women, and children together, and the men had clubs and stone axes and knives to keep away the hungry animals, and to kill some of them for food for themselves and the women and children. That living together and helping each other was the beginning of our civilization. For civilization is really only the art of living together and helping each other. And the greater the number of people who can live together and the more they can help each other, the more civilized they are, and the more safe and happy they are.

Fig. 132. — Early Men Helping Each Other against the Cave Bear.

In the picture of the Fuegians (Fig. 133) you see a little band of savages, like those in the last picture of the cave bear. And the Fuegians are helping each other, too. They live away down in South America, where it is cold and snowy, as you see from the picture. They do not have much but fish to eat. When the fish fail them, or the water gets frozen over at one place, they move to another place and carry all their things with them, even their house and their boats. You see their smaller boat dragged through the snow, but I do not suppose you can see their larger boat and their house. Those sticks they have on their backs are the house and the larger boat.

FIG. 133. — Fuegians Helping Each Other to Move.

When they reach the water that you can see at the right of the picture, they will set up a few of the long sticks and pile a little brush about it and call it a house, though the snow will blow through it and cover them up when they are asleep. The other long sticks they will tie together and make into a sort of boat to use in fishing. I do not suppose you would think much of their boats or their houses, and I dare say you think you would be very wretched if you had to wade barefoot through the deep snow, and fish in the water in a leaky canoe, and sleep in the snow. But they may feel that they are much better off than the people who have no boats and no houses at

all; and I am sure they are happier than some savages who help each other even less than the Fuegians do. The Fuegians are more civilized than such savages. Their canoe is the first step toward building a vessel. You have to learn your letters and words before you can learn to read, and so men had to learn how to help each other tie rods to make a canoe before they could learn to help each other put the oak planks or steel plates together to make the huge vessel you see in the first picture;

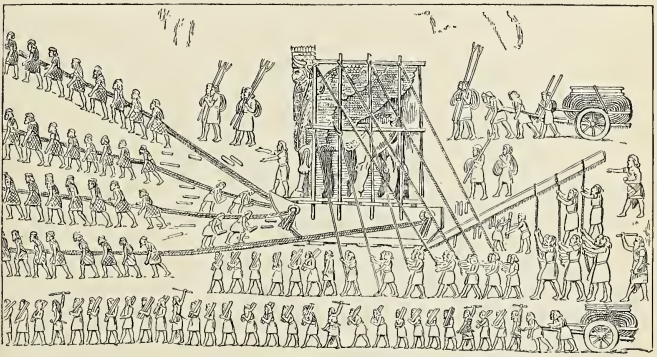


Fig. 134. — Assyrians Helping Each Other to Move.

and they had to learn how to help each other build a wigwam of sticks, before they could learn how to build the great steel buildings we have, fifteen or twenty stories high.

You see in the next picture (Fig. 134) how the Assyrians moved the great stone image that was to make one side of the door of one of their great palaces. The picture is not a very good one, because it is copied from carving on a stone wall made about three thousand years ago, before they had learned how to make very good pictures; but it shows how they

helped each other to build their houses in those days. You see they put the great heavy stone on a sort of sled made of wood, and a lot of men on each side held it by ropes to keep it from falling over, while a lot more men took hold of long ropes and pulled it along. Other men put rollers on the ground for it to slide over, and still others pried it along by a big timber from behind; and in the lowest row of men they are carrying the rollers along and drawing the big ropes in wagons. This was the way they moved the great stones into place to build their houses. They did it by helping each other; and they never could have built any large houses if they had not helped each other.

Fig. 135. — Africans Helping Each Other to Prepare Food.

In the picture of the women grinding flour (Fig. 135) you can see how people begin to help each other get food. When the savage family wanted fish or meat, the men would go fishing or hunting for the whole family, and when it was bread that was wanted, the women would stay at home grinding up the wheat by rubbing it on a stone. Each of the women at the left side of the picture is stooping over a large, flat-topped stone. On that stone the woman puts some grains of wheat and then takes the smaller stone and rubs the wheat till it is broken and crushed into white flour, which runs down the

sloping stone into the big bowl sitting under the edge of the stone. When they get enough of the flour they make bread of it. In a large family somebody has to do the grinding all the time to keep bread enough on hand, and somebody must be fishing or hunting all the time to keep up the supply of flesh. If the men stopped doing their share of work, the family would be likely to starve, and if the women stopped doing their share the same thing would happen.

As men have grown more civilized—more able and willing to help each other—they have gathered in larger bands, and some of the families have done all the fishing, while others have raised cattle instead of hunting, so that we could have meat; and still others have made the rivers grind the wheat by means of water wheels, so that we could have flour; and yet others have planted the wheat, so that we might have plenty of grain. So the farmers help us by giving us the wheat, the millers by giving us the flour, the ranchmen and butchers by giving us the meat, the fishermen by giving us the fish, the weavers by giving us the cloth, the miners by giving us the iron and steel and coal. Of course we have to help all these people in turn, or they and their families would starve. What do your parents do for all these people to pay them for what they do for us?

In the picture of the Japanese mother buying some candy for her baby (Fig. 136) you see that the mother not only does not have to make the candy, but she does not have to go to the store to buy it. The man brings it right to the door. If you look closely, you will notice that she is handing a piece of paper to the man. I suppose she is giving him some money to pay him for the candy, and he seems quite willing to give his candy for the money, because he knows he can use it to buy bread and clothing for his wife and children. Where do you suppose

she got the money? Of course you will say that her husband gave it to her, as all Japanese husbands do. But where did he get it? He helped somebody else by doing something for him and was paid in money. So that the use of money itself is really a means which we have found out of helping each other more easily than we could without it. It is only civilized people — people who help each other — who have money, and every single piece of money, — if it is earned and not stolen, — means just so much help that the owner of the money has done for some one in earning the money.

FIG. 136. — Japanese Helping Each Other to Get Food.

All are needed by each one;
Nothing is good or fair alone.

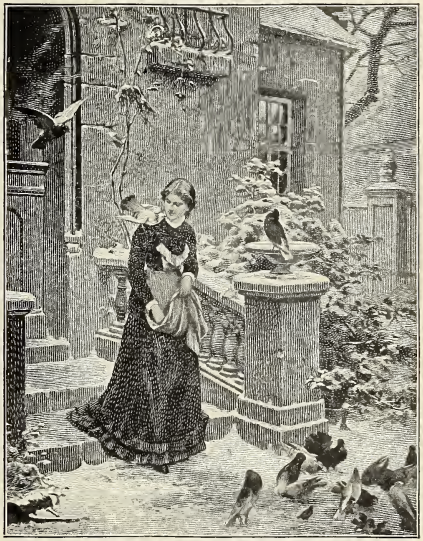
He serveth the servant,
The brave he loves amain.

EMERSON.

CHAPTER XXIII.

HOW MEN AND BIRDS LAY UP FOOD.

"THE FORESTER'S DAUGHTER" is the name of this picture. The young lady's father is the "Forester" — the man who takes care of the lands of a German nobleman. So she lives in the country, where she can have birds for her pets. When the ground is all covered with snow, so that the birds could not find anything to eat, she gives them food. She has her apron full of something that they like very much, so that they fly right up to her and even alight on her shoulder to get it. What do you suppose it is, and where did she get it? Perhaps it is corn, or wheat, or some other grain, and I imagine that her father has a lot of it stored up in his barn or his granary. He knew that when winter came



and covered the ground with snow, he and his family would want the grain for food. So he planted the grain in the spring, and when it was ripe he harvested it and stored it up in a building he had made for it. Wherever men are civilized they lay up food in summer for the winter time, so that they may not starve, as the poor Indians did here in America and as savages do everywhere. Here in Chicago we have a lot of "grain elevators," as they are called, which have been built to hold the millions of bushels of grain that the farmers raise on their farms. This grain is loaded on the cars and drawn to the elevator, and then carried up by machinery from the car to the top of the building, more than a hundred feet from the ground. From there it is poured into the great bins or rooms of the elevator, till we want it to eat, when it is drawn out of the bottom of the bins and sent to the mills to be ground into flour.

But men did not learn to make such great storehouses as these elevators all at once. They made smaller buildings first. In the picture of the Egyptians storing grain (Fig. 138) you

FIG. 138. — Ancient Egyptians Laying up Wheat in a Brick Granary.

can see the granaries that they had in Egypt thousands of years ago. The picture is not a very good one, because it was drawn by the Egyptians themselves, who could draw no better than children, but it is meant to show how they stored up their wheat. They used to spread the stalks with the heads of grain upon the ground and drive the cattle over them to tread the

grain out of the husks. Then they would toss it in the air, to let the wind blow away the straw and chaff, as you see one of them doing on the left. They did not have any threshing machines as we do now, and so they had to do it that way. When it was clean enough they put it into that box-like thing in the middle of the picture, which is really a round brick building with a hole in the top to put the grain in, and another hole at the bottom to take it out, very much like one of our elevators, only a great deal smaller. The Egyptians used to have a lot of these round brick granaries built together, and fill them at harvest time and then draw out the grain, little by little, as they needed it to eat.

Fig. 139. — An Indian House in Venezuela.

But before men had learned to make bricks, even, they used to store up food. To keep it safe they used to cut down tree trunks with their stone axes and drive them into the bottom of shallow lakes and build rough houses on the top of these piles, out of the reach of the waves and of animals and men on the shore. You see one of these pile houses in the picture (Fig. 139) of the South American Indians. That is the way they lived in Venezuela a few years ago, and that is the way they lived in Switzerland a great many centuries ago, long before history began; only they did not have any white cloth to wear in those early times. We can still find their piles in the bottom

of the Swiss lakes, and among the piles we can rake up the stone knives and stone hatchets that they used then. In some places we can find a bushel or two of grain, some nuts, and some apples cut up and dried. These things are burnt by fire, showing that the pile houses of these early men caught fire and burnt down, and the food they had gathered for the winter fell through the burnt floor into the lake, where it has lain for thousands of years. In some of the caves where men lived even before they learned how to build pile dwellings, we find little heaps of grain and dried fruit tucked away in some nook to use in the winter and then forgotten and left untouched all these ages.

So you see how men learned to lay up food, first a few handfuls of dried berries in a cave, then a few bushels of grain and nuts in a pile house, and then a few hundred bushels of wheat in the brick granaries of Egypt, till now we have millions of bushels stored up in our elevators here in Chicago alone. No one need starve to death in winter now, as the Indians did in the story of Hiawatha, and as they must have done still more before they learned to plant corn for food. They thought that Hiawatha had given them the corn. You remember how sad his heart was because his people had nothing to eat but birds and beasts and berries and fish. For the snow and ice prevented the poor Indians from getting this food in winter. So Hiawatha prayed the gods to give his people something that they could eat even in winter, and Mondamin, the God of the Indian Corn, came down and wrestled with Hiawatha, and suffered himself to be slain. But before his death he told Hiawatha to bury him and he would rise again and grow into a beautiful plant with seeds for the people to eat, no matter how much snow and ice there might be.

And victorious Hiawatha
Made the grave as he commanded,
Stripped the garments from Mondamin,
Stripped his tattered plumage from him,
Laid him in the earth, and made it
Soft and loose and light above him;
Kept it clean from weeds and insects.
Till at length a small green feather
From the earth shot slowly upward,
Then another and another.
And before the summer ended
Stood the maize in all its beauty,
With its shining robes about it,
And its long, soft, yellow tresses;
And in rapture Hiawatha
Cried aloud, "It is Mondamin!
Yes, the friend of man, Mondamin!"

But some god has given us not only corn, but also wheat and rice and a dozen other foods that we can gather and store up in our great storehouses, so that all can be fed. If any one lacks food anywhere, as the people of India did a few years ago, we draw out the grain from our granaries and load it on a ship and send it to them. By learning to lay up food we can help each other better than ever before.

The birds, too, have learned to lay up food, but they have learned to fly so well that they do not often need to do it. When winter comes with its snow and ice they fly away to the south, where they find plenty of food.

Far over purple seas
They wait, in sunny ease,
The balmy southern breeze
To bring them to their northern homes once more.

But even the birds sometimes store up food for the future. I remember how puzzled I was once by finding an acorn sticking in a little hole made in the bark of an oak tree trunk in Michigan, something as you see it in the picture (Fig. 140) of the California woodpecker, only the tree trunk was straight up and down. The hole exactly fitted the acorn, yet it had not been made by a knife or an auger. It looked as if it had been made by a woodpecker. But if it had I could not understand how the acorn could have been pushed tightly into the hole so that only the cup end stuck out. But I have learned since that the hole had been made by a woodpecker, and that he had brought the acorn and hammered it in, that he might get it for food whenever he needed it. Our red-headed woodpeckers do not do it very often, but the California woodpecker stores up ever so many acorns this way, just filling the bark of oak and pine trees with nuts in the fall. And sometimes they try to store them up in the boards of houses. A man in California let the birds use the end of his house for this purpose, and they sometimes made the holes in the boards so deep that when they tried to eat the nuts they lost one now and then by its dropping through into the house. But on the ground outside he found only

Fig. 140. — The Woodpecker Storing Acorns in the Bark of a Tree.

the empty shells they had thrown away after eating the meat.

I suppose the woodpeckers store up food more than other birds because they have such a sharp, strong bill to cut into the wood with. You see in the picture (Fig. 141) of their nest

Fig. 141. — The Woodpeckers' Nest.

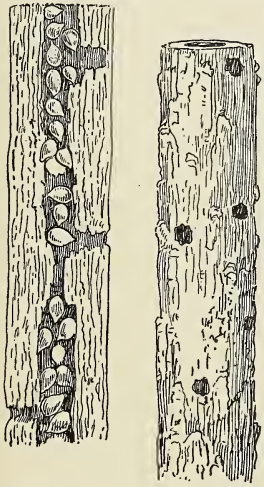


Fig. 142. — The Woodpeckers' Storehouse.

how well they dig right into the middle of the tree and make a large hole for their eggs. One of them is going into the nest and the other is just beginning to make a nest. You might think they would dig out such a place as this for the nuts; but the mice and squirrels could get at them if they did. So they stick them into the bark one by one, or else they find a hollow, reed-like plant, so hard that the mice and squirrels cannot nibble it, and put them in there till they want them. In the picture of the woodpeckers' storehouse (Fig. 142) you

see the hollow stalk that these birds use in Mexico. On the right hand it is shown with the holes the birds make to put the acorns in, while on the left it is cut open so you can see the acorns in it. In the autumn, when the acorns are ripe, the birds find these plants and drill holes in them and bring acorns and drop them into the holes till the plant is full, as you see it on the left. Then, as winter comes and there is no other food, the birds come and thrust their sharp bills into the hole at the bottom and draw the nuts out one by one, sticking each one in a hole in the bark of a tree to eat it. A Swiss student saw some of these birds getting and eating the acorns this way in the spring at a place where they must have brought the nuts thirty miles, because the nearest oak trees were as far away as that.

So you see the birds have found out how to make elevators for nuts and to bring the acorns from their farms miles away and store them up till they need them, just as men do. I suppose the same Wisdom that taught us taught them also.

Sow love, and taste its fruitage pure;
Sow peace, and reap its harvest bright;
Sow sunbeams on the rock and moor,
And find a harvest-home of light.

BONAR.

CHAPTER XXIV.

HOW THE RODENTS LAY UP FOOD.

Sir Edwin Landseer, who painted the first picture that we had, is the one who painted this picture also. He calls it "A Piper and a Pair of Nut-Crackers." The "piper" is that little bird singing so gaily, and I suppose the "nut-crackers" must be those two pretty squirrels sitting up in the hollow of the tree and eating nuts so busily. But they are not exactly "nut-crackers," because they do not crack their nuts. They use their sharp teeth to nibble the shell away till it falls off and leaves the nut in their tiny hands, and they then eat the nut by nibbling it a little at a time. They like to make their home in the hollow trees and eat their food there, as you see them doing

in the picture. You can see some nuts scattered about them in the hollow tree. They have brought those nuts into their home to eat when they want them. They do not like to go out to get food when it is cold or rainy. If you happened to be in a forest just before a rain storm, you would see the squirrels all hurrying about and gathering food as fast as they could, and carrying it to their nests in the trees. But as soon as the rain began every squirrel would disappear. Then if you could look softly into their nests you would see them packed cozily away, sometimes three or four in a nest, and with plenty to eat till the storm was over. And you would find that all the openings in their nests were carefully closed by leaves or twigs to keep out the wind and rain.

But when the long, cold winter comes they have to lay up a great deal more food than they do against a rainy day. So in the fall you will see them very busy gathering the nuts from the trees as fast as they get ripe, and storing them away in various places. The red squirrels are the ones we see oftenest in this country, and they generally lay up their food in the hollow trees where they live during the winter, and sometimes a single pair will store up between one and two bushels of nuts. But in Maine, where I used to live when I was a boy, the red squirrels used to hide the nuts they gathered in little piles under the leaves near the tree they grew on. There was one oak tree that had better acorns than any other tree, and the squirrels used to come out of the forest to that tree and gather the acorns and put them in little holes in the ground and cover them over with leaves. I suppose they thought that they would not have time to carry them so far while they were gathering them. I have learned since that they come to get them later, when they have eaten up the food they have in their nest. They remem-

ber the exact spot where they hid them, so that they can dig with their little feet down through the snow and get them. But I am afraid that some of the squirrels that hid the acorns near that tree were disappointed when they came to get them in the winter, for we boys used to look under the leaves and sometimes find the little treasures. We thought it was great fun to have the squirrels gather our nuts for us, but I don't believe it was great fun for the poor little fellows when they came in the cold and snow to get their store of food and had to go back without it.

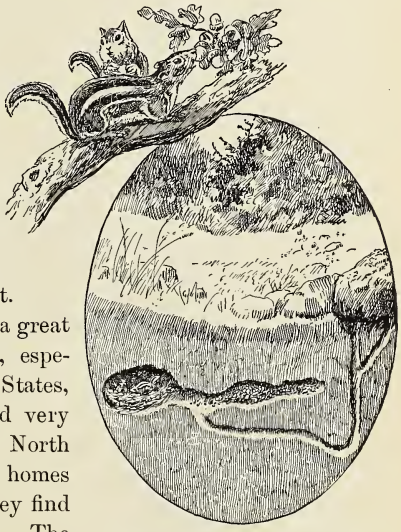


Fig. 144. — Nest and Storeroom of the Chipmunks.

But the squirrels sleep a great deal during the winter, especially in our Northern States, and so they do not need very much food. In the far North they make their winter homes underground, because they find it too cold in the trees. The little striped squirrel, or "chipmunk," as we used to call him, lives under the ground summer and winter both. In the picture (Fig. 144) of the storehouse of the chipmunk you can see how he makes his house. Two or three feet below the ground he has a large room carpeted with soft, dry leaves. In this room Mrs. Chipmunk tends her little ones till they

get large enough to take care of themselves. But besides this nursery and living room there are several other rooms leading off in different directions. You see one of them in the picture leading up towards the right-hand side of the picture. These side rooms are the cellars or storerooms of the Chipmunk family, and the members of the family are very busy in the autumn gathering their little harvest and packing it away in the different rooms of their underground house. In a single one of these houses a naturalist found one quart of hazel nuts, eight quarts of acorns, two quarts of buckwheat, and four quarts of wheat, besides some grass seed, making fifteen quarts these little creatures had gathered and stored away; and they had to bring much of the food a long distance. How do you suppose they can carry such things as wheat? Each one of them has a bag in his cheeks on each side of his mouth, and he can pack away in these bags three or four hazel nuts at once and a tablespoonful or two of wheat. If you could look closely at one of them as he was going home with his load of food, you would think he had the mumps, because his cheeks stick out so.

FIG. 145. — Nest and Storehouse of the Dormouse.

Another little nibbler that lays up food is the dormouse. You see how small a creature it is in the picture of the dor-

mouse's storehouse (Fig. 145), for it is only a little longer than the stag beetle; and the younger dormouse, at the right of the picture, seems afraid of the beetle and thinks of climbing into its little home out of danger; for that little bunch of twisted leaves and grass is the summer house of the dormouse, built up in the crotch of a bush. But the dormouse does not lay up its winter food in the summer house. It finds some secret nook, like the underside of a stick that is lying on the ground, and stores its nuts and grain up there. You see the larger dormouse in the picture bringing a hazel nut down from the tree to hide it with the little pile heaped up at the lower corner of the cut. When winter comes it will make a nest for itself in some snug, sheltered place and go to sleep and stay asleep most of the time till the warmer weather comes. Then it will wake up hungry and will find its little store of nuts and eat them. How do you suppose it knows that it is going to need the food when it wakes? Who tells it to lay up the store?

Fig. 146. — The Crying Hares Harvesting Hay.

You will find another wise little nibbler in the picture of the crying hares harvesting hay (Fig. 146). These creatures live in the mountains of Asia, but they have an American cousin living in the Rocky Mountains, and the cousin is called a cony

by the people who live there. You see that one of them has his mouth full of grass. He has been cutting the grass with his sharp little teeth, and now he is carrying it to some little nook in the rocks where he will dry it and pack it away for use in the winter when the ground is covered deep with snow. These hares, or conies, live in holes in the ground and they make little paths running from one hole to the other. In summer, when the grass has grown large and high, they cut it down each side of those paths and dry it and store it away. Then when winter comes they make paths under the snow from their underground homes to the little rocky nooks or barns where they have stored their hay, so that whenever they are hungry they can run to their store and get some food. So you see that they too have learned somehow to know that they will need food for the winter and to be wise enough to lay it up beforehand.

But the wisest of all these wise nibblers is the beaver, who lays up his food in the water. And that he may have water to lay it up in, he makes a pond for himself by building a dam in a stream. He and his wife, with two or three other beaver families, unite to build the dam. They must have logs to build it with, and as they do not have any axe to cut with, they fell the trees by gnawing around them with their sharp teeth. When a tree has fallen they cut it up into pieces short enough to be rolled into the stream. Then they push the pieces out into the place where they want their dam and pile them up there, with stones and mud on them to keep them in place. When the dam is high enough, so that they have a pond, they build houses like those you see in the picture (Fig. 147) of the beaver laying up food. Each pair of beavers has their own house, built by piling logs together and plastering the logs over

with mud. The houses are just about big enough for play-houses for babies, but I am afraid our babies could not use them very well, because the doors are under the water, and they have no windows at all. But the beavers do not mind that, because they like to swim and dive in the water, and Mrs. Beaver has a soft, dry bed in her house for the beaver babies. Mr. and Mrs. Beaver and the babies live in their house in the winter, when the pond is all frozen over, and as their food is the tender bark of the young shoots of trees they must store them up in the water before it is frozen over. So you will see them "working like beavers" all through the fall, gnawing down trees and nibbling off the young shoots and smaller branches to lay up for food. As soon as a small branch is cut up the right length the beaver rolls it into the pond and swims with it to a place near his house, and then he dives to the bottom and fastens the branch there. After that he goes back to get another branch and brings it and fastens it beside the first, and so on till he has a great pile of tender branches lying in the water close to the door of his house. Then when winter comes and the water is covered with ice, he dives down through the doorway — for that is under water, too, you remember —

Fig. 147. — Beavers Laying up Food.

and pulls a branch out of the mud and takes it into his house through that doorway. Then he and Mrs. Beaver and all the young Beavers have a nice juicy meal, for the water keeps the bark on the branches from drying up.

And after all the trees near the pond have been cut down the wise little creatures will dig canals from the pond to the trees that are farther off, so that the water can float the heavy branches and logs down to his home, just as men dig canals to float the grain to the cities that need it. When the ground rises they will even make locks — make stairs, as it were, in the canal, to float the logs down the hill. I shall not try to explain how such locks are made, because you are none of you old enough to understand it. Nor were the Indians educated enough to understand it so as to make such locks for themselves. They always carried their canoes around such falls. So you see that somebody had taught these creatures so well that they were wiser in some things than the men who lived about them.

> Who taught the nations of the field and wood
> To shun their poison and to choose their food?
>
> POPE.

CHAPTER XXV.

HOW THE INSECTS LAY UP FOOD.

"BUSINESS IS DEAD" is the name the French artist gives to this picture. You can see what the little fellow's business was — a business that I imagine most of you would like very much. He was selling candy. Just now no one seems to be buying of him, and so he helps himself to one of the sticks. If you had a lot of candy, I think you would find it hard not to touch it. How would you like to belong to a family where they laid up candy for food, where they had all of their pantries filled with candy instead of bread and meat? I know of a family that does this, though I am afraid you cannot belong to it, because it is the Bee family.

All summer long the bees who live in our hives are busy laying up candy in the form of honey, and their pantries are full of little honey jars, like those you see in

the picture of the bee's pantry (Fig. 149). The jars are made of a wax, which is called beeswax, because it is made by the bees. When they want the wax, a lot of the bees hang themselves up in a sort of curtain in the hive, and after they have been hanging quietly for a while little plates of the wax begin to form on the underside of their bodies. Each one pulls out her plates one after the other and chews the wax in her mouth to make it soft, and then uses it to build the little honey jars that you see in the picture. As fast as they finish the jars they fill them with honey, which they get from the flowers. Each of the little hive bees has inside of her body a tiny honey sack, that will hold about one-third of a drop, and she fills this honey sack by sucking up through her tube-like tongue the sweet juices of the flowers. Sometimes she has to visit very many flowers before she can get enough to fill the sack; but when she has filled it, she goes flying straight back to the hive and hurries in through the doorway and climbs up on the pantry of honey jars, — or honeycomb as it is called, — and puts her head inside one of the jars and empties the honey out of her sack into the jar. Then she goes out of the hive to fill the sack again and to bring another third of a drop to put in the jar.

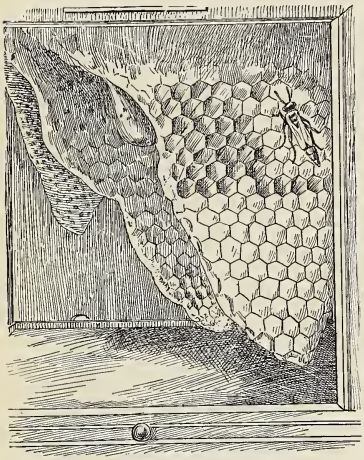


Fig. 149. — The Bees' Pantry of Wax Honey Jars.

So she and her thousands of sisters work all day long and all summer long, and when the cold winter comes they have a good many pounds of honey laid up to feed on during the time that there are no flowers. And besides the honey, they gather the pollen on the flowers and store it up to use for bread to eat with the honey. If you watch the bees closely in the summer, as they go into the hive, you will see little yellow bunches on their hind legs. Those bunches are made of the pollen, which they stick to their legs as they gather it from the flowers, something as you would put acorns in your pockets as you gather them under the trees. When they get into the hive they scrape the pollen off and put it into one of the empty honey jars, pushing it down with their heads. So that they have both bread and honey to feed upon in winter.

But the bees are not the only insects that lay up honey. Some of the ants, who are the cousins of the bees, have learned to do the same thing. But instead of making cells of wax, the ants have stored their honey up in the honey sacks inside of their bodies. By using the sack for this purpose it has stretched so that it is as large as a pea and will hold quite a lot of honey. But it makes the ant look very odd, as you see from the pictures of the honey ants; and the honey bag is so heavy that the ant who has it cannot walk about. She becomes a sort of living honey bag. In the picture (Fig. 150) of the honey ants pulling a honey carrier into the house, you can see how helpless the ant is. The man who drew the picture had

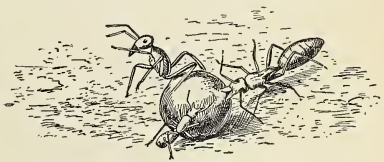


Fig. 150. — Honey Ants Helping a Live Honey Bag.

cut into one of their nests to see how they lived, and in doing so he left one of these honey carriers out of the nest. She could not help herself back into the nest, but two of her sisters came up and one of them pulled at her big bag and the other pushed to get her into a safe place. In the other picture (Fig. 151), one of the honey carriers has fallen from her hold on the wall, in the upper part of the picture, and one of her sisters has come to help her up to her place again. She takes her sister by the teeth — or mandibles, as they call the ant's pincer-shaped mouth — and pulls. In the lower part of the picture you can see that she has dragged her up to her place. There are several hundreds of these honey carriers in each nest, and when they are all filled full there would be quite a lot of honey stored up for winter. Of course their sisters who have the small bags must bring the honey to them and feed them with it. Then when there is no honey to be had out of doors they can pay their sisters by feeding them in turn.

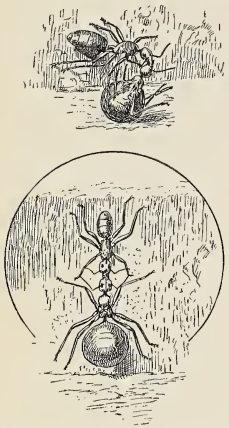


Fig. 151.—A Honey Ant Helping a Live Honey Bag to its Place in the Pantry.

Another way that ants have of getting food for winter is by laying up the seeds and plants, just as men lay up wheat. In the picture of an ants' storehouse (Fig. 152) you see the tiny underground rooms leading off from the passageway on both sides. The ants dig the round passageways — or ant-holes — down a few inches and then make a level, circular room, something like a small saucer bottom side up, and then they dig

down a few inches farther and make another, and so on till they go down six or eight feet into the ground. Some of these rooms they use for nurseries, but others for storing up seeds. The lowest room in the picture has seed in it, while the middle room is empty. In the next picture (Fig. 153) you can see how the ant uses her jaws — or mandibles — in biting and tearing the seed loose. When she has broken the seed from the stalk she will carry it to the nest and store it in one of the rooms. Then she will come back and get another seed, and so on, till all the seeds of the sunflower are gathered. While she is doing this her sisters are hunting through the grass in all directions for other seeds and bringing them in as fast as they find them, so that when winter comes and there are no more seeds to be found out of doors they will have plenty of food in their storerooms. If the rain gets into their storehouse and wets their grain, they will bring the seeds up out of the storerooms and spread them in the sunshine to dry them on the first clear day, just as men would do with their grain, then pick them up and carry them back again as soon as they are dried. For these wise little creatures have learned that if a seed gets wet it will sprout and grow and so be spoilt for food, but if it is kept dry it will not grow.

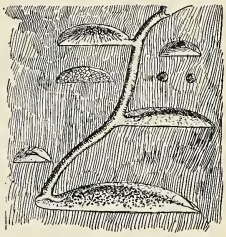


Fig. 152. — The Ants' Storehouse.

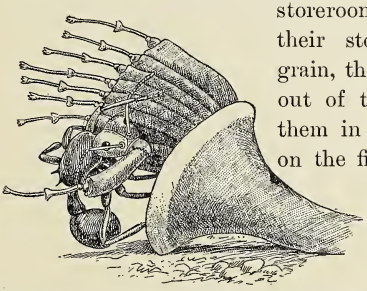


Fig. 153. — An Ant Harvesting Sunflower Seeds.

Of course it is hard for the ants to carry these seeds so far, for many of the grains are as large as the ants themselves; so the ingenious little things make roads leading in all directions from their nest and clear a space right around the nest, as you can see in the picture of an ant-clearing (Fig. 154). The roads are two or three inches wide at the end nearest the nest, and grow narrower and sometimes divide as they get farther away.

Fig. 154. — The Ants' Clearing and Farm.

Some of the ants even raise a crop of seed right on their clearing itself. Each spring a lot of ant rice, as it is called, grows up in a ring around the opening of their nest, just far enough away from the nest to leave them room to move about. As soon as the rice is ripe the ants gather the seeds and store them underground. Then they go right to work cutting down the stalks of the ant rice, as you see them doing in the picture (Fig. 155); one of them biting at the end close to the ground,

and the other bending the stalk by getting at the top end of it. In a short time their clearing is entirely free from the ant rice, with only a stump of grass left here and there like the one you see at the corner of the picture, looking exactly like the stumps the human farmers leave on their fields. The ant field stays cleared till the new crop comes up next year, when they harvest it and clear it away once more; they do this year after year, as regularly as the farmer gathers his corn and clears his ground for a new crop. And so men have thought that they planted the rice and have called them the agricultural or farmer ants; they live in America, in the southwestern part of our own country, and perhaps some of you can watch them and find out whether they really plant the rice or not; they are so wonderfully wise in other things that I should not be at all surprised to learn that they are really tiny farmers. Long ago they were known to lay up seeds for food. The Romans, two thousand years ago, noticed that these tiny insects, in the time of the harvest, carried little grains down into the ground, that they might have food to eat when there were no seeds to be had in the fields. You remember, too, that the Jews had already noticed the same thing. One of that nation wrote to his countrymen: "Go to the ant, thou sluggard; consider her ways and be wise: which, having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest."

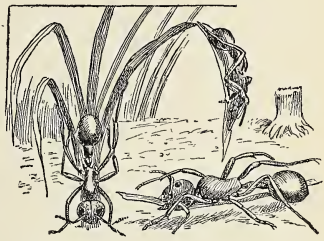


FIG. 155. — Two Ants Cutting Down a Grass Stalk.

But if it should prove that these little creatures really plant

their seeds as well as harvest them, they are even wiser than we thought. Yet, whether they are farmers or not, you see that they have been taught to provide for the future by storing up food just as the animals and men do, and that the same Wisdom that tells us to provide for the future also tells them and teaches them the way.

Seeing only what is fair,
  Sipping only what is sweet,
Thou dost mock at fate and care,
  Leave the chaff and take the wheat.

EMERSON, *The Humble Bee.*

CHAPTER XXVI.

HOW THE PLANTS LAY UP FOOD.

How frightened those poor little children are! They must wish their father and mother were there now, with all of those deer gathered about them. They have got close to a big tree for safety, and you can see how the older sister has one hand

on the tree and the other around her younger sister's neck. The brave little girl is bound to protect her sister, even if she is afraid. But she need not be afraid of those gentle creatures. They would be afraid of her and would all run away if she should start toward them. They have only gathered to see

what these two little girls in the forest are like ; for deer are very inquisitive creatures, and hunters often catch them by setting up some strange object in the woods. They will quickly gather about it to see what it is, as they have gathered about these two little girls.

But how did these girls happen to get out into the forest among the deer? If you will look on the ground near their feet, you will see a little basket with some flowers in it, and I suppose from that basket that they were out in the woods gathering flowers. Their mother dressed them warmly, because it was still cold weather, and let them take the basket and go into the woods for the earliest flowers, like the hepatica and anemone and the trailing arbutus, which we used to call the mayflower in New England, though we found it in April. But these little children are English girls, and so I suppose they do not find our mayflowers in their English forest. Yet they have found some very much like them, as you see from the picture; and they find the flowers early in the spring, because the flowers in the forest have to bloom early in the year or not at all ; for when the trees have put forth their leaves the forest will be so shaded and dark that the plants could not get the sunshine they need for their flowers. You remember that the flower is only the cradle in which the mother plant tends and feeds her baby seeds, and she cannot feed the babies without getting food somewhere. If she waited to get it from the earth and the air through the leaves and roots, she could not cradle her baby seeds until the roots and leaves had been getting food and storing it up for weeks and months. But by that time in the forest it would be too late for her babies to get the sunshine they need.

So what do you suppose these thoughtful little mother plants

who live in the shady forest do? They lay up the food for their flowers and their baby seeds the year before. All summer long the plant is sucking up fluid matter through its rootlets and using every ray of sunshine that steals through the forest leaves to change such matter to food fit for its baby seeds the next year. In the picture of the primrose (Fig. 157) you can see, down under the leaves, the thick stalk with the little roots starting out from it. That thick stalk is where Mrs. Primrose laid up the food for her babies last summer. She packed the stalk full of nice food, and when the cold winter came she went fast to sleep. But as soon as spring came she built up that long stem with the cluster of flowers on the top of it, filled with baby seeds, and each seed with its own store of food. Mrs. Primrose could not have done that, if she had not had that store of last year's food to use, and as soon as she gets the family of baby seeds well started in the world, she will begin to gather more food through her roots and leaves and lay it up for her children next year.

FIG. 157. — The Storehouse of the Primrose.

In the picture of the crocus' storehouse on the next page (Fig. 158), you can see still better how Mrs. Crocus lays up the food for her family. That round ball is only a short, fat stem packed full of food, as you can see on the left side of the picture,

which shows the stem cut into two pieces. The reason the crocus can send up its blossom so early is because Mrs. Crocus stored up the food last year. I suppose she must have lived in the forest at first, or in some place where her baby seeds would not have a chance in life unless she started them very early in the spring. So she laid up the food for them the year before. She still keeps up the habit, though she no longer lives in the forest, but has been transplanted to our open lawns.

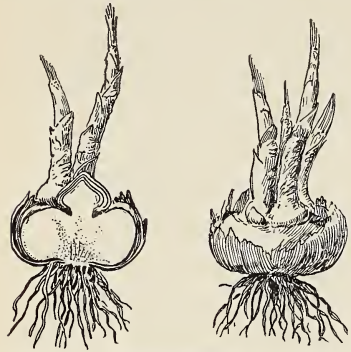


Fig. 158. — The Storehouse of the Crocus.

The lily is another plant that stores up food for the next year, but instead of packing it all in the stem, she puts most of it in the leaves. You remember the picture we had of the baby lily in winter flannels (Fig. 159), and if you could look closely at the leaves that are packed about the baby plant, you would find that they are thick and filled with food. If you cut open an onion, you can see the thickened leaves, for the onion belongs to the same family as the lily, and lays up food one year for its babies the next year. And the onion does even more than the lily does to protect the baby plants inside the thick wrappers. When you cut up the onion

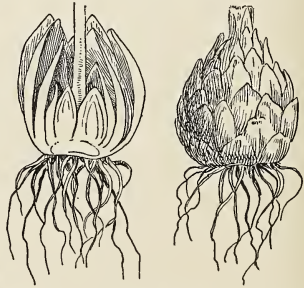


Fig. 159. — The Storehouse of the Lily.

the smell will be so strong that it will make your tears come, and you will let onions alone after that. That strong smell is a plan of Mrs. Onion to protect her store of food and the baby plant inside. She makes the food smell so bad that few of the animals will touch it, and so she keeps it safe until spring, when she changes it into flowers and baby seeds.

Another plant that is wise enough to lay up food for the next year is the potato. You see the potato hill, as we call it, in the picture (Fig. 160). The French artist has drawn it in such a way that you can also see the newly forming potatoes in the ground, at the bottom of the plant, as well as the blossoms at the top of the stalks. When those blossoms have cradled the baby seeds and packed them away in the round potato balls, the plant will work hard storing up starch in the potatoes for food next year. Although the potatoes are under ground, they are really a part of the stalk and not of the root, and they have buds on them — the little "eyes" as they are called. During the cold winter weather these eyes will be shut up in sleep, but as soon as the warm sun of spring shines, they will wake up and begin to feed on the white starch in the potato and grow very rapidly. If they are in the cellar away from the light, they

Fig. 160. — The Store-Rooms of the Potato.

will try as hard as they can to reach the light. I found a potato once that had been left on the floor of the cellar farthest from the window, and the new shoots had pushed halfway across the cellar floor in trying to reach the light of the window. If I had left it, I suppose it would have gone clear across the floor and climbed up to the cellar window and spread its leaves out to the sun and air, and tried to blossom and feed its seeds and start them in life. I have heard of a potato that did this through twenty feet of stalk, and even tried to lay up some more food for next year in new potatoes. That was hard work for the poor potato, and its new potatoes were rather small. But it tried as hard as it could to do its duty and keep its family alive by starting the baby seeds and then storing up food for its buds, so that they should find something to eat when they waked up another spring.

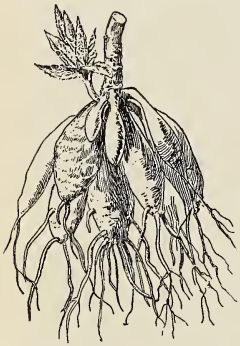


Fig. 161. — The Store-Rooms of the Dahlia.

Another potato that lays up food is the sweet potato, but its storehouse is not in the stalk, but in the roots, where it packs away its yellowish food to start with when it wakes up in the spring after its winter sleep. In the picture of the dahlia's storehouse (Fig. 161) you can see how the food is laid away. You can see more than half a dozen long, plump bags of food hanging to the large stalk of last year's plant. Each of those plump bags was only a little slender root last spring. But after Mrs. Dahlia had opened her large, bright blossoms and provided her baby seeds with food, she began to get ready for the next year. She used all the sunshine she

could get to make food, which she packed away in those little roots until they grew as large as you see them in the picture. Then the frost came and pinched all the leaves, and poor Mrs. Dahlia had to stop her work and go to sleep, something as the potato does. But as soon as spring comes she wakes up again and begins to eat the food she laid away last fall and sends down new roots and sends up new leaves, as you see her doing in the picture; and in a few weeks she will have another family of baby seeds cradled in her gay blossoms.

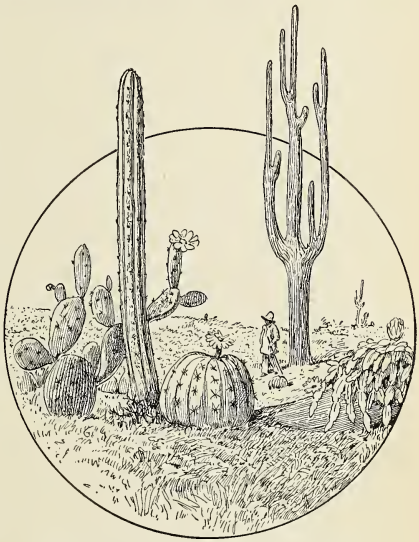


Fig. 162. — The Storehouse of the Cactus.

In the picture of the cactus' storehouses (Fig. 162) you can see the wise way the plants lay up food in the hot countries. In those countries they do not have any frost or cold winters, but they have a rainy season and then a long, dry spell of weather so hot that it would burn up all of our green leaves. So the plants there have found out how to get along without any thin leaves, and they have made their stalks and tree trunks into large cisterns of food, just as we often have cisterns to catch the water when it rains and keep it to use later. So they catch

the water in the rainy season and store it up for use later, when they open their flowers in the sunshine.

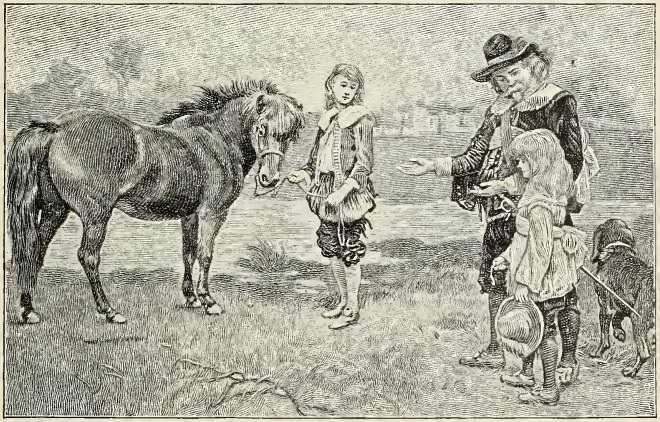
So you see that plants can plan for hot weather as well as for cold weather, and can build storehouses and make the food, while men and animals cannot make the food, but can only gather it and store it up. And whom do you suppose they get all their wisdom from, so that they can foresee the hot weather and the cold weather, and lay up food to feed on when they awake from their long sleep? You remember that the insects have the same Wisdom, and so do the animals and the birds, and men, too. The same Wisdom seems to be thinking in the plant and insect that thinks in our own brain, and that Wisdom seems to be helping all things to be wise, if they are willing to try to learn.

> I laugh at the lore and pride of man,
> At the sophist school and the learned clan;
> For what are they all in their high conceit
> When man in the bush with God may meet?
>
> EMERSON.

CHAPTER XXVII.

BORROWING STRENGTH FROM OTHERS.

You all remember Mrs. Burnett's sweet and touching story of Little Lord Fauntleroy. The little fellow was born here in America and grew up to boyhood with very little money to spend for anything but food and clothes. But when he was



seven or eight years old he found out that he was really an English lord, and his grandfather took him home to live in wealth and luxury and gave him everything he could think of to please him. One of the presents he received was a pretty pony, which you see in this picture of "Little Lord Fauntle-

roy's Birthday Present." I suppose the pretty boy on the right of the picture is the little lord himself, very glad indeed to think that he has got a pony of his own ; for, as he told his grandfather, he had often watched the boys of New York ride on their ponies and wished that he had one himself.

And why do you suppose he wanted a pony? Why would you yourself like to have a pony? To ride on it, of course. A pony can go a great deal faster than a boy can run, and when you get on the pony's back you can use his strength to carry you, and a much heavier load than you are, as far as you want to go. For thousands and thousands of years, before men had learned to make engines and railroads, they had to borrow the strength of the beasts to carry them and their loads wherever they wanted to go. The horse is so gentle and strong and swift that I suppose men have borrowed more from him than from any other living creature.

Another animal that men have borrowed much from is the dog ; you can see one in the same picture that has the pony. Little Lord Fauntleroy is holding the dog by the hand, and if he wished he could teach the dog to draw him in a little wagon or a sled, but he would rather have his pony do it, because the pony is stronger than the dog. But away up north, where they do not have any ponies, or where the snow is so deep that the heavy horses would sink into the snow, they train the dogs to draw sleds with heavy loads on them. You see one of the dog sledges in the picture (Fig. 164) with five dogs drawing it, but when they wish to carry a heavier load they use twice as many dogs ; they can carry three or four grown people and go a hundred miles a day, which is twice as fast as a horse could go. The dogs are so wise, too, that if they come to a place where the ice is too thin to bear them, they will spread out, so

that they may be farther apart and less likely to break the ice ; and when they reach the end of their long day's journey, they pass the night sleeping close to their master, who would freeze without them, because the weather is so very cold. It is so cold indeed that sometimes their master has to put boots on the dogs' feet to keep them from freezing as they draw him over the snow and ice.

Fig. 164. — A Russian Borrowing the Strength of Dogs.

Long ages ago, before there were any cities on the earth, or any houses, or any herds of cattle or flocks of sheep to give men food and clothing, — in that far-off time when men were only savages living in caves, — they borrowed the strength and speed of the dog a great deal more than they do now. Men had not yet learned to plant corn and wheat in the earth for food, so that when the cold winter came and there was nothing to eat save the flesh of the wild animals, the father, who wished to feed his children, had to go out in the forest and catch a bear or a deer for food ; but the bear and the deer were so swift and strong that it would have been very hard for a man to catch them; so man trained the dog to help him. Perhaps he took some baby dog from its wild, wolf-like mother and brought it up in the cave along with his own little boys and girls. When it grew large and strong it wanted to chase

the wild animals of the woods and catch and eat them, as its parents had done when they lived their wild lives in the forests ; but the man taught the dog not to eat what it caught, but to give it to its master and its master's children. So the strength of the dog probably saved men from starving all over the world in those early days, and helped them to live better, as the strength of the dog helps the Eskimos to live better now.

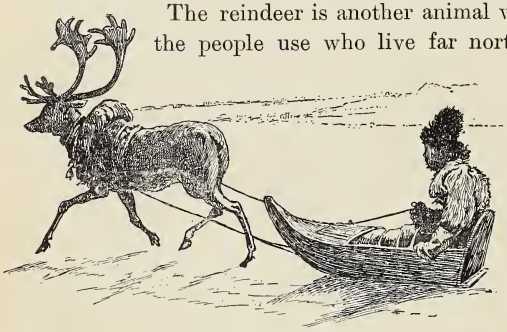


Fig. 165. — A Laplander Borrowing the Strength of Reindeer.

The reindeer is another animal whose strength the people use who live far north in the cold countries about the pole. In the picture of the Laplander (Fig. 165) you can see the sort of box-like sled they make to travel in. They put a collar around the neck of the reindeer and fasten the sled to it by cords ; nearly always, too, the driver has reins tied to the antlers, or horns of the deer, though our picture does not seem to show them. With their team they can go sixty or seventy miles a day, which is faster than our horses can go ; and the feet of the deer do not sink into the snow as the horse's would, because they are made so that they spread out flat, something as our hand does when we press it on a table. Besides lending their strength to carry their masters about, these reindeer also furnish food by giving milk ; for the deer are cousins of the cow. But the deer have never learned to stand still while

being milked; when milking time comes the milkmaids have to catch the deer by throwing a noose over her horns; then they bind the deer fast to a log so that she cannot move until they have finished the milking.

Over in India the cow or the ox is the animal whose strength is borrowed most. In the picture of the Hindus (Fig. 166) you can see one way they borrow the ox's strength. Instead of the mother using part of her strength for grinding, the ox is harnessed to the mill and has blinds on his eyes to keep his mind on his work, and a bell on his neck to tell when he stops; by walking round and round in a circle he turns the mill and does all the grinding, while the mother can use all of her time and strength in tending her baby, as you see her doing in the picture. But besides doing all the grinding, the oxen draw people about in carriages, as the dogs and reindeer do up north, though the oxen do not travel quite so swiftly as the dogs and deer; but they have learned to travel much faster than our oxen do, and of course they can draw a much heavier load than the dog or the deer. Their masters take their strength also to plough the ground as we do, and to gather in the harvest; so that a Hindu would feel lost without his cows and oxen, as our farmers would with neither oxen nor horses; for without their strength he could do hardly any of the farm work that he does now.

Fig. 166.—Hindus Borrowing the Strength of the Ox.

Another animal whose strength has been used by man is the great elephant which you see in the picture (Fig. 167). He is lifting a big heavy timber that would be a load for several men, and he is laying it on the top of the pile which you see at back of the picture. He takes hold of the timber by his trunk, which is a sort of nose and upper lip together; it is stronger than the strongest man's arm and yet so delicate that it can pick up a pin from the ground. The keeper is sitting on the elephant's neck telling him what to do, but after he is trained he will do the work without any keeper to direct him; if his keeper shows him the timbers and where they are to be piled, the animal will go to work and pile them up one by one, just as carefully and as exactly as a crew of men could do it. This great animal is as gentle as he is wise and strong, and he is as trusty as a dog. He loves his keeper and his keeper's wife and children, so that it is not safe for any one to do them the slightest harm while he is around; the keeper's wife can even leave her little baby with him before the baby can walk. The elephant is kept chained by the foot when he is not at work,

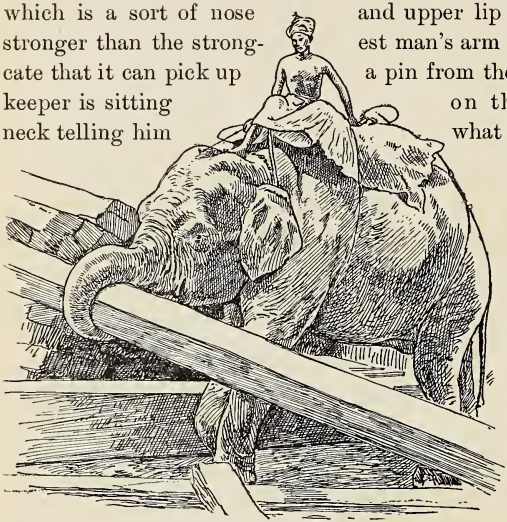


FIG. 167. — A Hindu Borrowing the Strength of the Elephant.

and whenever he sees the baby creeping beyond his reach he winds his trunk about the baby's waist, and takes her up as gently as her own mother could, and sets her down where she will be within his reach. And he will amuse her by taking her up clasped in his trunk, and setting her on his great shoulder, which she seems to enjoy even more than she does getting on her father's shoulder. Indeed, the elephant seems gentler and kinder and more patient with his keeper's children than their own parents are.

So you see how men have borrowed strength from the animals of the world; from the great elephant and from the little dog, and from many others. We never could have done as much work as we have in ploughing the earth and making long roads, and building great cities, if we had not been able to borrow the strength of animals. But beside borrowing the strength of animals, we borrow the strength of the wind to blow our ships over the ocean and turn the windmills; we borrow the strength of the running water to turn our water wheels and move the machinery of great factories; we borrow the strength of the fire which heats the water in our engines and changes it to steam, so that it can turn our machinery and draw our cars as many miles in an hour as horses could in a day. And then we have learned to change the power of the steam engine and the waterfall into electricity, so that we borrow the strength of the lightning to draw our cars and do all our work for us; you can hardly think of any power that we do not borrow from somewhere. Surely we ought to be grateful to Some One for lending us all this strength which we find ready for our use, for this world seems packed full of powers in animals and wind and water and fire, just waiting till we should get wise enough to use them. First we learned how

to use the strength of dog and horse, and then we found out how to use the strength of wind and water; but it is only a little while since we became wise enough to train the steam to help us and "harness him down with our iron bands," yet already we are finding that the strength of the lightning is still better, if we can only learn how to train him to work for us. And I imagine we shall find still greater and better powers as we grow still wiser, for there appears to be no end to the store of strength in the world waiting for us to become wise enough to use it. We seem like children in a Father's workshop, with splendid tools all about us that we can use just as fast as we grow large enough to handle them.

River, and rose, and crag, and bird,
Frost, and sun, and eldest night
To me their aid preferred,
To me their promise plight.

EMERSON.

One all-extending, all-preserving Soul
Connects each being, greatest with the least;
Made beast in aid of man, and man in aid of beast;
All served, all serving; nothing stands alone;
The chain holds on, and where it ends, unknown.

POPE.

CHAPTER XXVIII.

BORROWING CLOTHING FROM OTHERS.

WHAT a gentle little boy that must be in the picture; for you see that not only the hen comes and eats out of his hand but the birds fly down close to him and pick up the crumbs. They have found that the little fellow is kind to them, and so they trust him; and as the ground is all covered with snow, the birds cannot find food elsewhere, as they could in the summer, and so they come to him; they have been clothed in feathers to keep them warm, but they must get food for themselves. You can see a rabbit, too, just behind the hen, looking through the bars of his house; and he, too, is warmly clothed by his covering

of fur. And you remember that Mother Nature clothes the sheep and the horse, and the dog and the cat, and the squirrel and the bear, and even the buds and the trees, by fibres or fur or feathers.

How do you suppose she manages about clothing men and women and children? She lets them borrow clothes from her other children. That little boy in the picture is clothed so warmly that, though it is winter, he has taken off his jacket to put on the snowy step where he sits; yet he borrowed all his clothes from the animals and the plants. His hat, his vest, his thick shirt, and his coat and trousers and stockings, all came from the animals, if they are all woolen, as I suppose they are.

Fig. 169. — Borrowing the Clothes of the Sheep.

They came from the wool of the sheep, and that wool, as you know, is only the clothing which Mother Nature provides for the sheep; each autumn and winter the wool grows long and warm on the sheep, so that they are comfortable during the cold winter weather, but when the warm spring comes again the long wool drops off, leaving the sheep cool and comfortable in the hot summer. And men take this wool to make woolen clothes of, but instead of waiting for the wool to fall off, men cut it off with shears, as you see them doing in the picture (Fig. 169) of the sheep.

In that way they get the wool all at once instead of having to pick it up little by little from the ground or bushes; then they take the wool to the mills and have it spun into woolen yarn and woven into woolen cloth, or knit into stockings, to keep the men and women and children warm in the cold weather.

Fig. 170. — The Borrowed Clothes of the Bear and the Deer.

But men did not always have sheep. Long, long before they had learned how to keep sheep, or to spin yarn or weave cloth, they used to keep themselves warm as you see them doing in the picture (Fig. 170) of men in the borrowed clothes of the deer and the bear. They took off the skin of the bear or the deer with the fur all on it, and threw it over their shoulders to keep them warm in the winter; they used it, too, as a roof for their houses, standing up poles as you see in the picture, and spreading the skin of the animals over them with the hair outside. That would keep off the wind and rain and snow, and they could build a fire inside to warm them and let the smoke go out of the hole in the top of the tent, just as the Indians do still with their wigwams.

But men found it hard to keep the bear skins on their shoulders without sleeves or buttons, so they cut the skins into coats with the stone knives they had, and sewed them up with

the needles of bone which they learned to make. In that way they had suits of clothes made of the skins of the animals, like the suits you see the Eskimos wearing in the picture (Fig. 171) of the clothes borrowed from the seals; for the Eskimos still clothe themselves in skins, and they find the skin of the seal the best and easiest to get. So, instead of having only a sealskin cloak as the women do among us, both the men and the women have complete suits of sealskin — boots, trousers, jacket, and cap; and the suits of the men and the women are so much alike that you could hardly tell them apart, if it were not for the fur bag on the back of the women where they carry the baby, as you see one of them doing in the picture.

Fig. 171. — In the Borrowed Clothes of the Seal.

The people who live in cold countries, as the Eskimos do, may get along by borrowing the clothing of seals, but those who live in hot countries would be altogether too warm with sealskin suits; yet they want some clothing to keep off the sun and the rain, so they borrow the clothing which Mother Nature gives the stems and leaves of the plants living in those

warm countries. You remember that the bark is the clothing of the tree, and if you should look at the inside of the bark of the elm or the basswood you would find a soft, stringy material there ; that is the lining of the tree's jacket, and it is such soft, strong fibres as these that men use to make cool clothing, just as they use the fibres of wool to make warm clothing ; but they generally use the jacket lining of the flax instead of the jacket lining of the basswood for their clothes. In the picture (Fig. 172) of some early cloth, you see the way men used to make their cloth when they were just learning how to weave and spin. For that rough bit of woven string is one of the oldest pieces of cloth in the world ; it was found in the bottom of a lake in Switzerland among the pile-dwellings, where people lived long ages ago ; it fell into the lake and the water kept it safe so that now we can see from it how they used to weave then.

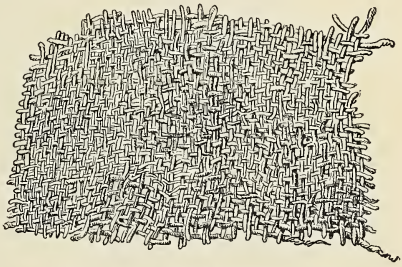


Fig. 172. — A Piece of Early Cloth.

But we do not know how they wore their clothes in that far-off time ; they probably just wrapped the cloth about their shoulders, as you see the Sandwich Islanders doing in the picture on the next page (Fig. 173). These people take the long leaves of the flax and get out the fibres and twist them into coarse strings, and then stretch the strings out just above the ground, and weave by hand a sort of coarse mat about as large as a sheet ; it is very slow work and takes a year and a half for a woman to weave herself one of them. She weaves in a pretty border,

as you see in the picture, and then she wraps it about her shoulders, and she is dressed. Her little boy behind her has a different sort of mat, one that will shed the water and keep him dry when it rains; it is woven like the other one, but it has rows of flax leaves woven in, one above the other, just as if you should have leaves pinned one above the other all over your coat. Of course the rain would run off from the leaves without wetting your coat; and so the rain runs off from the little fellow and he keeps dry — all but his head; if it rains very hard, I suppose he pulls his rain-coat up over his head and keeps that dry too.

FIG. 173. — In the Borrowed Clothes of the Flax.

But I dare say he does not care very much about keeping his head dry. Perhaps the hair of the head itself is a sort of cap which Mother Nature herself gave her human children to keep the wet and the cold and the heat from hurting their heads, long before they learned to wear any hats or caps or clothing of any kind. You know the old Romans used to travel about all over the world with their heads bare, except when they wore helmets in battles to ward off the blows. The American Indians were going

around bare-headed in the same way when this country was discovered; and there are still even to-day more people who go bare-headed than wear hats or bonnets.

Those Sandwich Islanders have not yet learned how to cut out their clothes to fit them and sew them up, any more than the Greeks and Romans had two thousand years ago. But we have begun to learn how to do it, though I suppose we have still a great deal more to learn about it; we have also learned how to borrow the clothing of other plants besides the flax. The flax gives us all of our linen cloth, but all of our cotton cloth comes from the cotton plant. The soft fibres that we use for our cloth are really the baby clothes which the mother plant makes for her baby seed, as you can see in the picture of the cotton baby (Fig. 174). Mrs. Cotton wants her baby to have a light and airy dress, and so she covers him with a lot of delicate downy fibres; and men pick off this downy dress as they shear off the fleece of the sheep, and use it for their own clothing.

Fig. 174. — A Cotton Baby in his Baby Clothes.

So you see that all of our clothes are borrowed — our woolen clothing from the sheep, our linen from the flax, and our cotton from the baby cotton seeds; while our silk is borrowed from the silkworm, and is really the silk quilt which he spins to wrap himself in when he goes to sleep. Our clothing seems to be borrowed from others just as much as our strength is, and I think we ought to be grateful to Some One for teaching the animals and plants how to spin such fine, soft fibres for us.

Perhaps we may sometime learn how to make such things as cotton and wool and linen without the help of the animals and plants, when we find out how they do it; and men are studying them very carefully and finding out more and more about them every year; but we have not learned the secret of making fur and fibres yet, so that we still have to get them to do it for us.

> And what they call their city way
> Is not their way, but hers,
> And what they say they made to-day,
> They learned of the oak and the firs.
>
> EMERSON, *Nature.*

TEACHING NOTES.

A practical following out of the human side of this subject might lead to the study of fabrics made by man and the methods of making them.

Examples of simple primitive clothing and its manufacture in the home give picturesque teaching of the customs of earlier times, and the perfection of modern machinery shows how much of civilization has centered about that which was provided outright in the life of animals.

CHAPTER XXIX.

BORROWING FOOD FROM OTHERS.

Poor little fellow! He has n't any father or mother of his own to give him food, and so he has to go out in the cold winter weather and ask others for something to eat, and this kind woman has given him a bowl of milk and some of the bread that she had for her own little girl. You can see the little girl clinging to her mother and looking with wonder at a boy that does not have any mother of his own to give him food. Where do you suppose her mother got the bread and milk she is giving the poor little boy? Of course she got the milk from the milkman, and the flour for the bread from the

grocer. But the milkman had to get his milk from the cow, and you remember that the cow's food is the grass and grain that grows out of the earth; so that the milk was really borrowed from the plants, while the flour or meal is made of the seeds of wheat or barley or corn. The miller has to get these seeds from the farmer, and the farmer gets them in turn from the plants; so that our bread also is borrowed from the plants.

The grain, too, out of which we make our flour and bread is really the food which the wise plant mother lays up for its baby seeds. You remember the picture of the baby corn and its food (Fig. 176), which shows you at the top the little baby corn plant and the food which Mrs. Corn packs away with her baby in the autumn, that it may have something to eat as soon as it wakes up in the spring. You see her doing it in the lower part of the picture. That food which the corn mother lays up for her baby is just as good for animals and men to eat as it is for the corn. So men plant their fields with corn, and when the corn mothers have stored up hundreds and thousands of kernels full of food for their babies, the farmers borrow the food to feed their cattle or themselves; so that we borrow the baby food of the corn and the wheat and the oats to make our food of, just as we borrow the baby clothes of the cotton plant to make our clothing of.

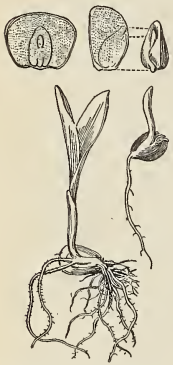


FIG. 176. — The Corn Baby and its Food.

And when our food is meat we borrow it from the plants just the same; for the animals from whom we borrow the meat borrow their food from the plants, as the cow does who gives us our beef, and the sheep who gives us our mutton. All the

animals borrow their food from the plants, even those that never eat the plants themselves. The lions and tigers feed wholly on other animals, like the giraffes of Africa; but the giraffes in turn live on the plants. Their tall bodies and long necks make them able to feed on the tender leaves of the trees, as you see them doing in the picture (Fig. 177); for they are three times as high as a man. They are really the cousins of the deer and the second cousins of the cows, and I suppose they got their long neck by trying to reach as high as they could. They stretched it little by little, till now they can eat all the leaves and fruit off from an orchard, where a cow could not get any food at all.

Fig. 177. — The Giraffe Borrowing the Food of the Acacia Tree.

In the picture on the next page (Fig. 178) you see how the monkeys borrow the food of the corn; for that is a cornfield the monkeys have entered, and they are having a nice feast on the corn. The home of these monkeys is in Central Africa, and their food used to be such insects and buds and wild fruits as they could pick up in the forests; but since men have begun to plant corn there the monkeys have learned that the easiest way to get food is to borrow it from the cornfield. When

the corn is ripe, a band of these monkeys will make their way along the forest by climbing from branch to branch and tree to tree, till they get close to the cornfield; then they will come down to the ground and go scampering into the cornfield, and begin to pull down the stalks and break off the ears and husk

Fig. 178. — Monkeys Borrowing the Food of the Corn.

them and eat the corn. Besides what they swallow, they stuff their cheeks full on both sides of their mouths, for they have big pockets in their cheeks, just as squirrels have; and they are as full of fun as the squirrels are, chatting and frolicking all the time. You see from the picture that the mothers take their baby monkeys along with them; one Mrs. Monkey has her baby clinging to her breast, and another leads her little

one along by having him take hold of her tail, as you might take hold of your mother's dress.

When they have got all the corn that they want to eat, they break off more ears to take away with them. They are very particular about getting the best ears, so that they will often tear open and throw away ten times as much as they take with them. In the front of the picture you can see two ears that they have husked and then thrown away. While they are getting the corn their leader is watching to see that no danger happens to them; for they choose the strongest and oldest of this number to lead them, and they follow him closely. He stands up and looks around while they get the food, and the moment he sees any one coming he tells them, and the mothers seize their babies in their arms, and the rest

FIG. 179. — Fish Borrowing the Food of Sea Plants.

grab four or five ears of corn apiece, and then they all rush away to the forest and clamber up the trees again and disappear among the branches, chattering as gaily as if they were so many children out of school.

The fish in the water, too, as well as the animals in the forests, borrow their food from the plants; for plants grow in the water as well as in the air, as you can see from the picture on the last page of the fish borrowing food (Fig. 179). If you have ever floated over the salt water when it was perfectly still and only a few feet deep, you must have seen that the bottom was all covered over with strange and beautiful plants, like those you see in the picture; for the water plants can have very long leaves and very slender stalks, because the wind never blows down there. No matter how wild the winds and waves may be on the surface, it is always calm at the bottom of the ocean. And the fish go swimming in and out among the water fields, nibbling at the plants or eating the creatures that live on them, just as the birds do among our orchards and forests.

The insects also have to borrow their food from the plants. If you watch a caterpillar's nest, you will see that the growing babies eat a great many of the leaves of the tree, and if you take the leaves away from them they will soon die. They cannot make food for themselves any more than you can. If you give a silkworm mulberry leaves enough, it will grow from a tiny worm no bigger than the head of a pin to a large caterpillar three inches long, as you see it in the picture (Fig. 180); and then it will spin itself a silken cocoon, as you see the lower caterpillar doing. He first spins some loose threads for the outside of this nest, and then bends his head clear back to his tail and turns it round and round, spinning and winding a thread of silk, something as it is wound on a spool of twist; so

that he makes of himself a sort of spool wound about with a silk thread a thousand feet long. Then the little fellow goes to sleep in his silk spool, and in a couple of weeks he changes into a moth like that you see in the top of the picture; but he could not do all this without borrowing the food of the mulberry tree.

Fig. 180. — Silkworms Borrowing the Food of the Mulberry.

We see, then, that all living creatures — insects, fish, animals, and men — must borrow their food from the plants; without food we should all grow weak and die. The horse would have no strength to lend us if we did not give him the food of plants; for somehow in borrowing food from plants we borrow strength too. The sheep would not have any wool to give us, nor the silkworm any silk, if they did not both of them first borrow the food of the plant; so that somehow in borrowing food we borrow clothing as well as strength. The plants alone seem to know how to change air and earth and water into food that shall keep us all alive and strong, from the worm up to the man. The worm knows how to change mulberry leaves to silk, but only the mulberry tree

knows how to change earth into the food of the leaf. The horse knows how to change oatmeal into muscle that shall draw your wagon, but only the oats know how to make the food. And though men have studied the plants very carefully, they have not yet found out this wonderful secret of making food out of the rock and the water and the air. How do you suppose the plants found it out? Some One who was very wise must have taught them how to do it, and must have told them to work all the summer long making food and laying it up for all the rest of the creatures that must have it to live and be warm and strong. Surely we ought to be grateful to these busy little plants that wake up at the earliest dawn and labor for us every hour of the whole day; and we ought to be still more grateful to the Wisdom that is working in them.

When the forest shall mislead me,
When the night and morning lie,
When sea and land refuse to feed me,
'T will be time enough to die.

EMERSON, *Woodnotes.*

There 's not a sparrow or a wren,
There 's not a blade of autumn grain,
Which the four seasons do not tend
And tides of life and increase lend.

EMERSON, *Threnody.*

CHAPTER XXX.

SLEEPING AND WAKING DAILY.

THAT dog has got tired of waiting for his little master to wake up; so he has stolen into his room and jumped upon his bed, and he looks as if he would bark to him softly, or kiss him, to rouse him from his sleep, that he may get up and dress and have a romp with him before school time. I do not believe

that the little boy's mother knows that the dog is trying to wake her son; if she did she would drive him away, for she wants the little fellow to have all the sleep he needs. She has got that nice soft bed for him with its handsome spread, and when evening comes she helps him to undress and put on that pretty nightgown, and then tucks him in so that he shall be warm, and I dare say she kisses him good night, and perhaps

she looks into his room the last thing before she goes to bed herself to see that he is all right. For she knows that while he is asleep he cannot look out for himself, and he might kick the clothes off and get cold, or roll out of bed and hurt himself. She would be very busy if she had a hundred little ones to put to bed every night, and had to keep them all covered up and safe in bed till morning, and then had to wake them and dress them all again; and if she had to put all the creatures in the world to sleep every night, — all the birds and all the beasts and all the insects, — and watch over them through the night to keep them safe, and wake them at the right time again every morning, I think she would be very much busier than even with a hundred children. I do not know of any woman who would be able to do it, and I do not believe all the women in the world could do it.

Yet Somebody puts all these creatures to bed and to sleep each night and keeps them safe while they are asleep and unconscious, and then wakes them all up again when the morning comes. When the birds have been working and playing and singing all day long and are tired out at night, they perch themselves on the small swaying branches up high on a tree, to be out of the way of any hungry cats that may come prowling around to get something to eat; then they go to sleep perched on the twigs and stay as safe as the leaves on the trees. How do you suppose they are kept from falling when they are asleep and no longer remember to hold on to the branch? If you will look at your canary bird's feet, you will see that the toes clasp the perch something as our hand would — three of the toes in front and one behind; and the bird's legs are so made that when he sits down close to the branch and doubles up his legs, those toes clasp the support without any effort on his

part. He really has to make an effort to unclasp them, so that when a bird is asleep he cannot fall from the branch; his feet hold him, just as our feet hold us on the ground when we stand up. We should have to make an effort to get off the ground. We should need to jump in order to do it; and in the same way the bird would have to rise up on the branch in order to get his feet loose from it. All a bird has to do, then, is to clasp his feet about the branch, sink down close to it and tuck his head under his wing, and he is as safe as if you stood by him and held him on.

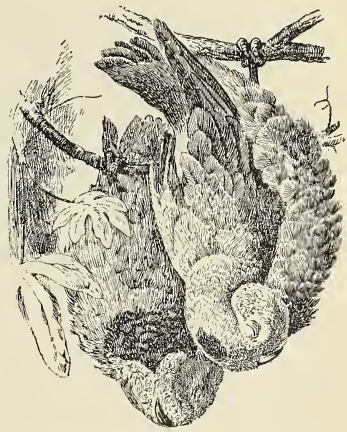


Fig. 182. — Putting the Parrots to Bed.

But the birds can sleep hanging down from the branch as well as sitting on it, as you see from the picture of the parrots asleep (Fig. 182). Their curved claws shut around the branch so fast that they would have to climb up on the branch to unhook them. So they can clasp one leg and curl the other up in their feathers, and put their beak in their feathers, too, and then sleep without any danger of falling out of bed. The bats sleep the same way, as you see from the picture on the next page (Fig. 183). Their claws are so sharp and so crooked that they have to pull themselves up by the claw on each wing in order to unhook their feet, as you see one of them doing at the upper left-hand corner of the picture. The one in the centre of the

picture shows you how they use their large soft wings to wrap themselves up in. They do not have a feather bed to sleep in as the birds do, but they have a fine warm quilt, and it has one great advantage over the feathers; it will hold their babies safe. The birds have to build nests for their babies, but Mrs. Bat just folds her wings about the baby, and he is just as safe as if he were in a hammock; there he and his mother sleep all day, for she goes out flying only by night.

Fig. 183. — Putting the Bats to Bed.

But even when animals have no feathers or wings to wrap themselves in, and when they cannot hang themselves from the branches, they are still put to bed and kept comfortable by Mother Nature, as you can see from the picture of the fox asleep (Fig. 184). He has bent himself into a ring, so that his long heavy fur is all on the outside and his bare legs are folded up inside where they will keep warm, while his mouth, nose, and eyes are nicely provided for by his large bushy tail. Of course he could not have long thick hair over his eyes and mouth, because that would prevent his seeing or eating, so he carries the hair on his tail instead. That is his quilt and his pillow, and he always has it at hand wherever he may be, when he wants to go to sleep. All he has to do is to find a quiet place where no one will be likely to disturb

him. But before lying down in his bed he goes round and round several times, sinking lower and lower with each turn,

Fig. 184. — Putting the Fox to Bed.

till he almost spins about on the ground in the place where he is going to sleep. By doing this he smooths down the twigs or the grass that may happen to be under him, and he strokes all of his long hair the right way, so that it will keep out the cold and the wet.

If you watch your dog as he goes to sleep some night, you may see him turn round in nearly the same way. The dog, you know, is a cousin of the fox, and used to be wild and live in the forest, and so he had to make himself a bed every night in the grass and the twigs and smooth down his hair the right way to keep out the cold and the wet. After he learned to live with man he no longer needed to level his bed or smooth his hair, but he had been in the habit of doing it so long that he still sometimes turns around, even on the floor

close to the fire. And when he has to sleep out in the cold he always coils himself up like a fox.

But the insects are put to bed as well as the higher animals. In the picture of the ants getting ready for bed (Fig. 185) you can see how they close the door of their house at nightfall. Their ant-hill is made of little pebbles which they have piled up around their hole. When it comes night they take the pebbles in their mouths, as you see one of them doing, and carry them to the hole and pile them up one on the other, as men pile up stones when they make a wall. After the hole is all filled excepting one little place at the top, the last ant crawls in through that hole, as you see her doing at the bottom of the picture, and then with her head she pushes sand up against the hole from inside, thus stopping it all up. Then there are no signs of any ants all night long, till about eight o'clock in the morning. At that time, if you should watch the closed door carefully, you would notice a pair of tiny feelers thrust out through the chinks between the stones. Then an ant pushes out and begins to carry the stones away, and then another ant appears, and another, till the whole family comes pouring out. What do you suppose they were doing during the night? If you were small enough to creep down into their little house and spend the night with them, you would see one ant after another taking naps three or four hours long. When one of the tiny creatures gets tired she lies down on the ground, curls her six legs up close to her body, and goes to sleep so soundly that you can brush her with a feather without waking her. When she has had her sleep out, she gets up, stretches her

FIG. 185. — Putting the Ants to Bed.

limbs and yawns, just as you and I might in the morning, and then she washes herself carefully all over. After that she is ready for her day's work again, and sets about tending the babies, or making new rooms, or getting food for the numerous family.

Fig. 186. — Putting the Leaves to Bed.

But the Sleep-Giver does not seem to forget even the plants. In the picture of a plant awake and asleep (Fig. 186) you will see on the left side how the leaf-stalks stretch out from the plant and hold the leaves out level to catch the sun's rays for making food; while on the right side, when the plant is in the darkness of night, the leaves fold up close to the plant. There is nothing for them to catch but cold, and so they cozy up close together to keep warm. They rest from their work till morning comes, when they stretch out their green faces to the light again, and work all day making food for us. If you should fasten some of the leaves so that they could not cozy up together, and then should put the plant out of doors some cool autumn night, you would find in the morning that the leaves you fastened had been frozen to death, like poor little babies left out in the cold, while the leaves that were free to lie up close to each other and to the mother plant would wake up all right.

So you see that Some One gives sleep to all the creatures on the earth, from the birds and animals down to the insects and plants. Some One knows when they are weary and gives them the rest they need. Some One remembers them when they are unconscious and unable to care for themselves, and Some One

wakes them again, made strong and able to work for another day.

His dews drop mutely on the hill,
His cloud above it saileth still,
Though on its slope men sow and reap.
More softly than the dew is shed
Or cloud is floated overhead,
"He giveth his beloved sleep."

ELIZABETH BARRETT BROWNING.

TEACHING NOTES.

Opportunity should be made in this connection for teaching the conditions of healthful, restful sleep, which may not be safely trifled with; the benefits of sleep by the effects of being deprived of it; the newness of life which each new day should bring; the influence of right thoughts as last thoughts at night — and other features of sleep that modern science is bringing to expression.

Disabuse the minds of children of the idea that the influences that lift their lives are limited by their own conscious efforts; and lead them to trust in the Power working always within them toward good, and especially active in healthful sleep.

CHAPTER XXXI.

SLEEPING AND WAKING YEARLY.

WHAT do you suppose that roguish-looking girl has in her hand? Of course you will say that it is a snowball, and that she is going to throw it at some of her playmates, but I wonder if you know what a snowball really is. It is a little piece of the great blanket which Mother Nature spreads over her plant children when they go to sleep in the fall. You know how she puts all of her great family to bed every night — from the plants up to men — and watches over them during the night, and wakes them in the morning rested and ready for another day of life

and love and labor. But some of her children are like newborn babies; they need to sleep more than just at night. If you ever watched a family of little kittens just born, you know that they want to sleep much of the day as well as the night, but when they grow larger and older they can keep awake more of the time. So in Mother Nature's great family the plants seem to need more sleep than the animals; they do not seem so much grown up as the animals are. When autumn comes the lilies and violets and grasses and all the plants living in our cold climate go to bed for a nice long nap, lasting all through the cold winter months. You remember how the mother plant wraps up the baby bulbs to keep them as warm as she can, as you see the mother lily doing in the picture (Fig. 188) which we have had before; but when the mother lily has done all that she can to keep her babies warm, and all the other plant mothers have wrapt their garments about their own babies, then Mother Nature spreads over them all a great white blanket of snow, as soft and light and warm as the comforter which your mother spreads over your little bed in winter.

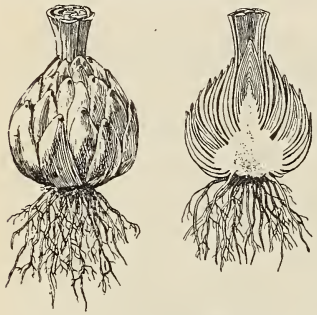


FIG. 188. — Baby Lilies in their Nightgowns.

But where do you think this great white blanket comes from? What is the snow made of? If you should look carefully at some freshly fallen snow you would see a lot of tiny, star-like crystals, as they are called, like those represented in the picture of the snowflakes (Fig. 189); and if you should hold these

tiny crystals in your hand or breathe on them with your warm breath, each one of them would melt into a little drop of water, showing you that snowflakes are only frozen raindrops. When the cold weather comes the particles of water, instead of clinging together in a round drop, march off in different directions, though still holding fast to each other, something as people form different figures in a dance; those different figures that the particles of water form are very beautiful, as you see from the picture; but besides being beautiful they are light and feathery, so that they keep the sleeping plants warm and comfortable. If those of you who live in the north should dig away the snow from your violet bed, or from your lawn, and keep the place bare all winter, you would find the violets and the grass frozen to death in the spring; but if you keep the flower bed and the grass covered with snow the sleeping plants will be safe, and when the warm sunshine wakes them again, they will open their mouths and drink in the melting snow, and begin to grow at once.

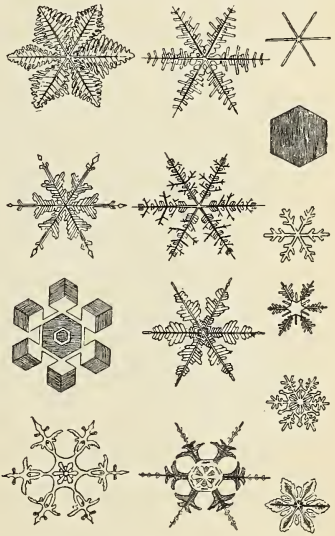


FIG. 189. — Snowflakes (magnified).

But besides the plants, Mother Nature puts to bed all the insects that live in cold countries and gives them an all-winter nap. You remember the picture of the ants and aphides at

dinner (Fig. 190). If you should mark the spot where the ants lived in the summer and should dig the ant-hill out in the middle of the winter, you would find all the ants sound asleep — the baby ants, the mothers, the nurses, and all the other workers; and in some of the ant-hills you would find the aphides, or ant-cows, also asleep. You know in the story of the Sleeping Beauty how every one fell asleep, — the princess, the king and queen, the cooks and the stable boys, and even the horses and cows, — and all slept till the bold prince came and kissed the princess; and then they all woke up just as they fell asleep. That was a fairy story, but the ants and their babies and their slaves and their cows all go to sleep, and really sleep motionless for months under the ground and under the blanket of snow, till some day the bright sun peeps into their hill and kisses them, and then they all awake and begin to tend the babies and milk the cows again, just as if they had slept only a night instead of a whole winter.

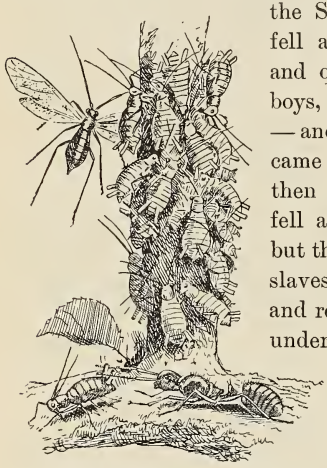


Fig. 190. — Ants and their Cows in Summer.

But the snails will sleep even longer than a winter, and longer even than a whole year. You see them in the water (Fig. 191) with their bodies outside of their shells; if you should take one of them out of the water, he would draw himself into his shell and shut the round door and seal it fast, so that he would keep moist and comfortable for a long time. A

snail was sent from Egypt to the British Museum and stuck fast to a board for people to look at in the collection, and he staid there for four long years; at the end of that time somebody happened to take the snail down and washed him in water, when the creature woke up and opened his door and came out. I suppose he thought spring had come again, after his four years' nap; the people of the Museum were so surprised and pleased to find him alive that they gave him food and put him in a moist place, where he lived a long time.

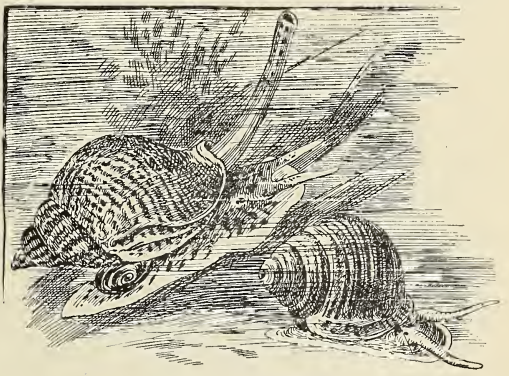


Fig. 191.—Snails Awake.

Mother Nature puts turtles to sleep through the winter just as she does the snails; when the weather grows cold enough for them to begin their long nap, they dig down a foot or so into the ground; then they pull their head and legs into their shell and go to sleep for the winter. Sometimes they get waked up too early. I knew of one who was sleeping underground in a forest, when he began to feel the earth grow warm about him; it grew so warm that it waked him, and he thought it must surely be spring, so he pushed out his legs and began to dig his way up to the top of the ground to enjoy the newly arrived spring. But when he reached the surface of the earth, he

found that the warmth came from a fire some men had kindled in the woods, and instead of its being spring it was still the middle of the winter; so after a little the poor fellow dug his way back again into the ground, pulled himself into his box and went to sleep once more to wait till spring really came, when he and all of his brothers and sisters came scrambling out of their beds. Some of the higher animals even seem to need this long nap in the winter, and so Mother Nature gives it to them. The hedgehog that you see tending her babies (Fig. 192) will make herself a nest under the roots of the trees in the autumn, and line it with leaves; and then she will curl herself up into a round ball with the bristles outside, looking like a great chestnut bur; there she will sleep month after month, all through the winter. She sleeps much more soundly than she does at night — so soundly that she seems to be quite dead, just as people do who go into a trance or a fit; but after a while, when spring comes again, Mother Nature remembers her child that is sleeping so soundly, and wakens her, and she comes out of her nest as wide awake as ever.

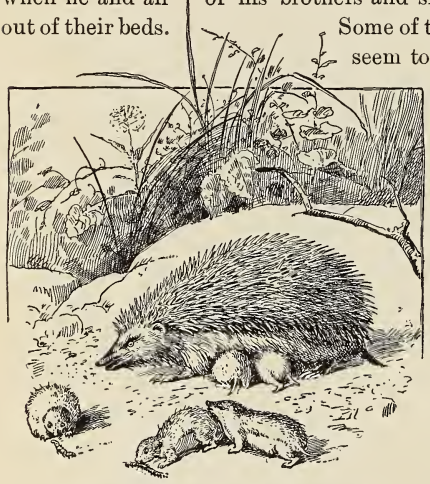


Fig. 192. — Mrs. Hedgehog and her Family.

In the next picture (Fig. 193) you will see another of

Mother Nature's children who is put to bed for the whole winter. It is the jumping mouse that lives in our fields; when autumn comes he burrows down into the ground a foot or two, so that the frost cannot reach him, and then he curls himself up in a little round ball and goes to sleep so soundly that you would think the little creature dead, if you should dig him out of his bed in the middle of the winter. But if you

FIG. 193. — The Jumping Mouse Waking up.

should take him home and warm him gently, he would stir first one tiny foot and then another, and then he would begin to breathe and would finally open his eyes and sit up and commence washing himself, as you see him doing in the picture; for that mouse was dug out of his bed in the winter and waked up in this way and then put under a glass case, when he began to make his toilet. I suppose he thought the morning had come after his long winter night underground and he wished to get himself ready for the new day.

So you see how kind Mother Nature is to all of her children. She seems to like to have them wake up and help her all they can, but when they need sleep she gives it to them and tucks them safely away in their beds for a whole winter, and spreads her great warm blanket of snow over them all — plants and insects and reptiles, and all of the animals that are not grown up enough yet to keep awake during the winter ; then when spring comes she wakes them all up again.

When the fierce northwestern blast
Cools sea and land so far and fast,
Thou already slumberest deep;
Woe and want thou canst outsleep.

EMERSON, *The Humble Bee.*

TEACHING NOTE.

The expression of the rising scale of life in terms of degrees of wakefulness may require some help from the teacher. The phrase in the paragraph above, "not grown up enough yet to keep awake during the winter," may be made the subject of conversation. What if the cow and horse and dog had kept the habit of taking long vacations for sleep? On the other hand, how difficult would be the conditions for the snail, turtle, and dormouse *with their present powers*, if no such kindly provision were made for them as is afforded by sleep during the period when food could not be had.

CHAPTER XXXII.

SLEEPING AND WAKING FOR A LIFETIME.

Her sweet little baby is fast asleep, and now she is going to lay him down in his dainty crib. She looks as if she would much rather hold him in her arms and have him wake up and smile into her face, but she knows he needs a great deal of sleep, and so she lets him sleep nearly all the time. He is just waking up into life and he has n't got really awake yet. He is only just beginning to know his mother and smile back into her face; but in a little while he will wake up enough to smile at his father, too, and stretch out his hands to him; then in a few months more he will be wide enough awake to get up on his feet and walk about, and in another year

he will learn to talk. Pretty soon he will have waked up enough to go to school and learn to read and write and play ball; then his mother will begin to feel that she is losing her little baby, but he will be so strong and helpful that she will not be sorry that he has waked up into a young man. Then he will work early and late for his own little boys and girls for many years; but at length he will begin to grow tired and sleepy again in his old age, as he was in his babyhood, and will find it hard work to walk and to remember people and words, and then at last he will go to sleep again in the great Mother's arms as softly and quietly as he slept in his mother's arms when he was a tiny baby. All over the world the little babies are waking in this way — waking first into boys and girls and then into men and women, and after that are growing drowsy once more with old age and sinking like tired children into sleep again, just as we all wake each morning to the work and play of a new day and

FIG. 195. — A Kitten not Waked up.

then sink at night into a sweet and restful sleep once more, if we have lived the day as we ought and done the best we could.

All the other animals are being wakened into life in this same way. You see that anxious mother with her baby kitten in her mouth (Fig. 195). Mrs. Puss had her babies in a tree, because she thought it was safer than a house full of boys and girls; but she saw a terrible thunderstorm coming up one day and she feared her kittens would get wet, so she brought them one by one in her mouth from the tree to the house. She had to do it because the little things were not yet waked up enough to do it for themselves. Only a week or two before, they had waked up so little that they had not even got their eyes open; but in a few weeks they will be wide awake enough to take care of themselves and not need to be carried in their mother's mouth any longer, and in another year they will be so wide awake that they will be caring for babies of their own and catching mice for them. Yet in a few years they, too, will begin to grow tired and drowsy and weak, and at last they will drop into sleep again, as men and women do, and the great Mother will take them tenderly in her arms and lay them away to rest.

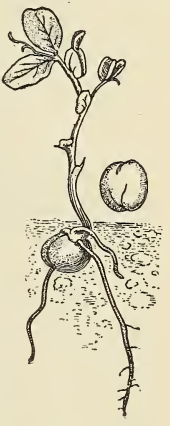


Fig. 196. — A Pea Waking up.

The plants, too, are being wakened into life in this same way, some of them for a very short lifetime and some for a very long one. You remember the picture of the baby pea waking up (Fig. 196). His mother has packed his little cheeks full of food, and as soon as the first warm day of spring comes he wakes slowly out of his sleep and begins to push his tiny root

down into the ground, and in a week you will see him breaking the soil for his first pair of leaves to come out into the sunshine and get the air. Then he will stretch his slender fingers up and clasp the bush you put there for him and climb higher and higher every hour; but in a month he will get as high as he can go, and in another month he will have raised his family of baby seeds, and soon he will begin to look pale and tired, and then he too will sink into Mother Nature's arms to sleep and rest after his three months' life. But the baby acorn that you see waking up in the other picture (Fig. 197) will live as long as you or I. Year after year he will go to sleep each fall for an all-winter nap and wake up in the spring for another summer of work. But even he will begin to grow old, and after a hundred years or so he will sink into the deeper and longer sleep that Mother Nature gives to her children when they need it.

Fig. 197.—An Oak Waking up.

So you see that the great Mother does not make any of her children live and work forever without getting any time to rest and sleep. She lets them all sleep at night, and those that need it she lets sleep in the winter as well as at night; and when they get tired out with life she gives them a still deeper sleep. And she allows some of her children to divide their lives in such a way that they seem to have two lifetimes with a sleep between. When the caterpillar that you see in the picture (Fig. 198) has finished his life-work as a caterpillar he sinks into a sleep so sound that it seems as if he was no longer alive; but after a few weeks or months the seemingly lifeless chrysa-

lid opens and out comes a beautiful creature with wings, who looks no more like a caterpillar than a bird does like a snake. If the butterfly remembers that he was a caterpillar once, and used to creep on the earth, he must think that he has somehow got a second life and one much better than the first. He might wonder who gave him his wings. But you know how

FIG. 198. — Caterpillars Waked up into Butterflies.

FIG. 199. — A Water-Baby Waking up into a Mayfly.

the water-baby, out of which the gauzy-winged mayfly comes, gets his wings. He gets them by climbing out of the water and trying as hard as he can to fly, as you see him doing in the picture (Fig. 199). If he did not climb out of the water, he never would have any wings, and he never would know anything about the bright and beautiful world of air, but would

think that there was nothing but water and mud anywhere. And the butterfly must have got his wings in the same way, by trying to fly when he was a caterpillar. Long ages ago the earlier caterpillars must have climbed the bushes and trees and stretched out their lungs into the air and boldly tried to fly. And when they had succeeded in getting wings, so that each new caterpillar found them growing, as we find our power to think and understand growing, then Mother Nature did a very kind thing for them. When the caterpillar had finished his caterpillar life and was all ready to have his wings come, she lulled him to sleep in her arms for a long nap, and during the sleep his body was made all over for him, so that when he woke he was no longer a creeping worm but a flying insect. He got only what he deserved, but he got it in a pleasanter way than the mayfly does.

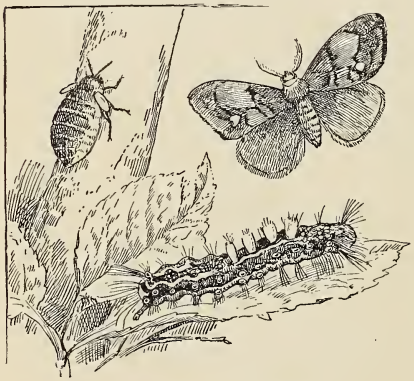


Fig. 200. — A Moth partly Waked up.

And so, I suppose, when we — her larger children — have finished our human life and done all we can for her here, she lulls us to sleep in her tender arms, and while we sleep she makes over those of us who have tried to stretch forth the wings of the soul, and gives us bodies better fitted to our growing powers. Therefore, the sleep at the end of life is even more kind and helpful than the sleep at the end of the day, or

at the end of the summer. But if we wish to wake up with wings next lifetime we must try all we can to fly this lifetime.

You remember the poor little moth-mother (Fig. 200), who waked up with stunted wings that she could not use to fly with, while Mr. Moth, who came from the same sort of a caterpillar, had the beautiful wings which you see in the picture. I suppose the only difference between them was that Mrs. Moth did not try so hard to fly as Mr. Moth did, and so her wings did not grow out so large and strong as his. But your wings and mine do not grow out of our body so that we can see them with our eyes or feel them with our hands. They grow out of our mind and soul, and if we try to think clearly and kindly, and try to help the whole world in every way that we can, we may lie down to sleep in the great Mother's loving arms without any fear but that she will give us just what we have deserved, and treat us as kindly as she treats any of her smaller children.

There is no death! What seems so is transition.

LONGFELLOW.

A dim capacity for wings
Degrades the dress I wear.

EMILY DICKINSON.

Life! we 've been long together,
Through pleasant and through cloudy weather.
'T is hard to part when friends are dear, —
Perhaps 't will cost a sigh, a tear;
— Then steal away, give little warning,
Choose thine own time;
Say not Good Night, — but in some brighter clime
Bid me Good Morning.

BARBAULD.

INDEX.

Acorn, long life of, 252.
Air, as a garment, 119; sliding through the, 130.
Alligators, maternal love of, 53; nest of, 52; tending the baby, 53.
Anatto, winter jackets for the seeds of the, 117.
Angler-fish, 69.
Animals, flying, 130; nests of, see *nests;* parental love of, 2, 3, 11, 13, 14, 16, 34, 35, 38, 40, 42, 43, 44, 45, 46, 47, 50, 51, 99, 101, 102, 132, 143, 228, 256, 257; protecting the mothers and children, 162; underclothes of, 98.
Ants, agriculture among the, 198; cattle-herding among, 79; civil engineering among, 159; getting ready for bed, 238; helping each other, 158; storehouse of the, 196; during the winter, 244.
Aphides, the cows that ants milk, 79.
Archer-fish, 68.
Armadillo, six-banded, 102; scaly coat of the, 103; three-banded, 103.
Ash tree starting the child in life, 123.
Assyrians, early architecture among, 173.

Barbauld, quotation from, 255.
Bats, maternal love of, 135; parental love of, 132, 136; wings of, 133.
Bear, clothes given us by the, 219; maternal love of, 47; parental love of, 99; sleep of, 235; winter clothes of, 99.
Beavers, construction of locks by, 192; dam-building by, 190; home of, 190.
Bees, Brazilian, 77; cradle of, 22; candy-eating among, 193; caring for the young, 155; feeding the babies, 77; furnishing the table among, 157; hive, 77; making the honeycomb, 194; marketing among, 77; method of carrying food, 195; nest of, 20, 22; storing winter supplies, 195.
Bird-land, domestic differences in, 8.
Birds, caring for the children, 34; form of the ancient, 141; feathered arm of, 139; feeding the young, 36; great-grandparents of, 138; molting, 92; necessity for clean clothes of, 93; need no granaries, 181; sometimes helped by men, 177; where they sleep, 234.
Bird-snake, 138.
Blackbirds, parental love of, 38.
Bobolinks at dinner, 63.
Bonar, quotation from, 184.
Borneo, flying frogs in, 130.
Bread, source of, 226.
Browning, E. B., quotation from, 240.

Browning, R., quotation from, 16, 24.
Buffaloes protecting the family, 163.
Butterflies, how they eat, 75; marketing among, 74.

Cactus, storehouse of, 207.
Canaries, toes of the, 234.
Caterpillars, how they got their wings, 254; resurrection of, 253; spinning the cocoon, 230.
Cats, foster-mothers among, 44; maternal love of, 43, 251; slow awakening of the baby, 251.
Chipmunk, home of the, 187.
Civilization, beginning of, 171; definition of, 171.
Clams, clothes of, 110; footprints of, 110.
Clothes, sources of man's, 218; suitable nature of, 139.
Coleridge, quotation from, 8.
Conies storing up food, 189.
Corn, providing for the baby, 226.
Cotton, making cloth from, 223; starting the baby in life, 126.
Cow tree, milking the, 83.
Cows, man's use of, 213; maternal love of, 42.
Cradles, of the bee, 22; of fish, 15; of the flower, 26; of the human baby, 1; of the humming-bird, 3; of the oriole, 4; of the rose bee, 23; of the spiders, 14; of the squirrels, 9; of the swallow, 19; of the titmouse, 6; of the wasps, 20; of the weaver bird, 7.
Crocus, storehouse of the, 203.
Crows, coöperation among, 167.

Dahlia, storerooms of the, 206.
Daisy, composite nature of the flower, 154; older sisters of the, 154.
Dandelions starting the babies in life, 125.
Deer, clothes given us by the, 219; gives us house-building material, 219.
Dickinson, quotation from, 255.
Dog, cousin of the wolf, 237; going to bed, 238; useful to man, 260.
Dormouse, storehouse of the, 189.
Dove's wings, 139.
Dragon, flying, 131.
Drones, nature's treatment of the, 158.

Egyptian granaries, 178; threshing machines, 178.
Elephant's clothing, 99; usefulness to man, 214.
Elk and wolves, 163.
Elk-yards, 163.
Elm trees starting their children in life, 123.
Emerson, quotations from, 56, 64, 72, 80, 96, 112, 120, 136, 152, 160, 176, 200, 208, 216, 224, 232, 248.
Eskimos' clothing, 220.

Filial love, 25.
Fire, making use of, 215.
Fish, cradles of the, 15; feeding on plants, 230; house-building, 15; marketing, 68; maternal love of, 50; method of fishing of the, 69; nests of, 15; raising the family, 16; tending the babies, 50.
Flax, linen cloth from, 222.
Flowers, as children, 26; baby clothes among, 27; cradles of the, 26; of

early spring, 202; nests of the, 26; providing against rain, 155.
Flying, human methods of, 143.
Food, early efforts to obtain, 174; storing up, 178; where does it come from, 232.
Fox, how he sleeps, 236.
Frog, flying, 130.
Fuegians, house-moving, 172.

Gall-fly, aided by the oak in raising its family, 24; cradle of the, 23.
Giraffe gets a long neck, 227.
Goldfinches, house-hunting, 39; parental love of, 40.
Goose, maternal love of the, 36.
Grebe caring for the babies, 95.

Hares, the crying, harvesting hay, 189.
Hedgehog, winter sleep of the, 246.
Hen, clothing of the baby, 91; maternal love of the, 34.
Heron, flight of the, 140.
Hiawatha, the legend of, 180.
Hindus getting the help of the cow, 213.
Hippopotamus, maternal love of the, 46.
Horse, man's use of the, 210.
Human family, cave-dwellers, 171; helping each other, 169, 175.
Humming-birds, cradles of the, 3; marketing, 61.
Hydra, division of labor and family life of the, 148.

Indians, pile-dwellings of the, 179; scarcity of food among the, 180.

Japanese travelling stores, 175.

Laplanders borrowing from reindeer, 212.
Lemur, flying, 131.
Lilies, in their night-gowns, 242; storehouses of, 204; winter clothing of, 116.
Lime trees caring for their babies, 119.
Lizards, flying, 131; grandparents of, 138.
Longfellow quoted, 225.
Lowell quoted, 56.
Lumpfish, parental love of, 50.

Mammoths, clothing of, 100.
Maple trees, milking the, 83; starting their children in life, 123.
Mason bees' cradles, 19.
Maternal love, making the baby's clothing, 90; of the alligator, 53; bat, 135; bear, 47; cat, 43; cow, 42; fish, 50; grebe, 36; hen, 35; hippopotamus, 46; opossum, 45; plants, 30; spider, 55; tiger, 45.
Mayfly, former existence of the, 253.
Mice, parental love of, 13.
Milk, sources of, 82.
Mondamin, the god of Indian corn, 180.
Money an agent in helping each other, 176.
Monkeys, at a corn-feast, 228; caring for the baby, 101; big brothers among, 165; bridge building, 164; dinner table of, 71; clothes of, 106; helping each other, 164.
Morris quoted, 168.
Moths, polyphemus, 76; who do not eat, 76.
Mouse, winter sleep of the, 247.
Mussels, clothing of the, 110.

Nest, of the alligator, 52; bee, 20, 22; fish, 15; flowers, 26; hummingbird, 3; mice, 12; oriole, 4; spiders, 14; squirrels, 9; tailor birds, 37; titmouse, 6; wasp, 20; weaver birds, 7.

Onion protecting its storehouse, 205.
Ophiocephalus, parental love of the, 51.
Opossum, parental love of the, 45.
Orioles, courtship and home-building among, 5; nests of, 4.
Oxen, man's use of, 213.
Oysters, clothing of, 109.

Parental love, see *Animals, parental love of.*
Parrots, sleep of the, 235.
Pea, awakening of the baby, 251; family duties of the, 150; short life of the, 252.
Pelicans, marketing, 62; tending their clothes, 95.
Pine trees starting their children in life, 124.
Plants, cradling the baby, 25; dinner table of, 87; division of labor in, 149; going to bed for the winter, 242; how they sleep, 239; need more sleep than animals, 242; storing up food, 263; the only food-producers, 232; variety in length of life, 251.
Pope quoted, 104, 192, 216.
Porcupines, parental love of, 101; useful clothing of, 101.
Potatoes, storehouse of, 205; the sweet, 206.
Primrose, storehouse of the, 203.
Ptarmigan, clothes of the, 91.

Reindeer, man's use of, 212; milking the, 213.
Robins marketing, 63.
Roots, intelligence of, 86.
Rose bees, cradles, 23; nest of, 23.

Sandwich Islanders, clothing of, 221.
Seals give us clothing, 220.
Seashells, listening to the, 106.
Seeds, awakening of, 31; flight of, 122.
Sheep, clothes of, 98; making clothes from the wool of, 218; protecting the family, 162.
Silkworms feeding on the mulberry tree, 230.
Sleep, death but a kind, 254; first awakening from, 249; last falling to, 250.
Snails, long sleep, 244; walking suits of the, 107; in the water, 108.
Snow, a blanket, 241; as a winter garment, 119; construction of, 242; usefulness of, 243.
Soap-bubbles, why they ascend, 122.
Sparrows, house-stealing, 166.
Spiders, cradles of, 14; flying machine among, 127; marketing, 70; maternal love of, 14, 55; tending the baby, 54.
Sponge, grandparents of, 147; growth of the family of, 147.
Squirrels, nest of, 9; nut-crackers among, 185; flying, 132; house-building, 10; parental love of, 11; raising a family, 11; storehouses among, 186.
Sticklebacks tending the baby, 52.
Sunfish tending the baby, 50.
Swallows, autumn trip of, 142; house-building, 18; feeding the young, 36;

French and American, 17; marketing, 59.
Swans, coöperation with the hen, 95.
Switzerland, early habitations in, 179.

Tailor birds, nests of, 37.
Teaching Notes, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 136, 144, 160, 168, 224, 240, 248.
Tennyson quoted, 32, 144.
Thistles caring for their babies, 155.
Tigers, maternal love of, 45.
Titmice, cradles of, 6.
Toads, dinner tables of, 66.
Trees, bark clothing of, 115; cork, 115; low, 82; making clothing from the, 221; marketing, 84; sugar-maple, 83; starting their children, 123; winter clothing, 117.
Turtles, winter sleep of, 245.

Vampires, wings of, 134.
Virginia creeper, fingers of, 151.

Wasps, cradles of, 20; house-building, 21.
Wasson quoted, 48, 128.
Water lending its strength to man, 215.
Weaver birds, coöperative house-building of, 166.
Whittier quoted, 40, 88.
Wind lending its strength to man, 215.
Wings, how made, 139; how used, 137, 140, 142.
Woodpeckers, marketing, 59; storing food, 183.
Workers, nature's care for the, 152.

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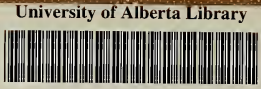

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